

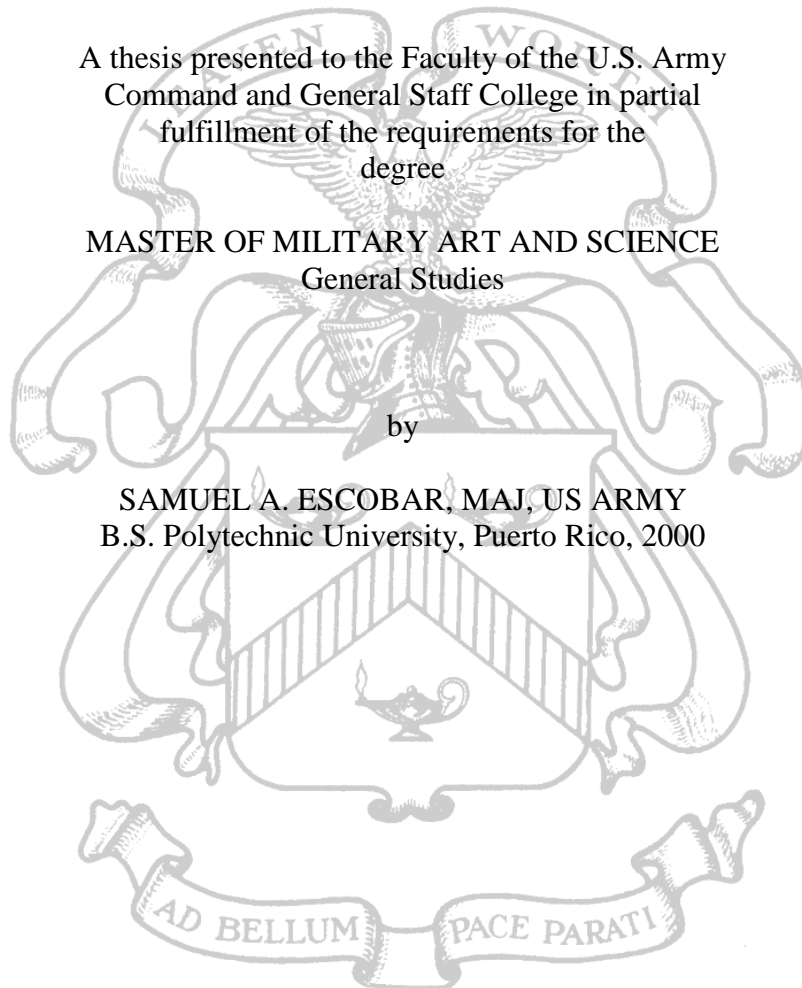
ENGINEER COMPANY FORCE STRUCTURE “FORCE MODULARIZATION” IN  
SUPPORT OF DECISIVE ACTION. DOES THE CORPS OF ENGINEERS NEED  
TO RE-STRUCTURE ENGINEER CONSTRUCTION COMPANIES AGAIN  
IN ORDER TO SUPPORT DECISIVE ACTIONS?

A thesis presented to the Faculty of the U.S. Army  
Command and General Staff College in partial  
fulfillment of the requirements for the  
degree

MASTER OF MILITARY ART AND SCIENCE  
General Studies

by

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## ABSTRACT

ENGINEER COMPANY FORCE STRUCTURE “FORCE MODULARIZATION” IN SUPPORT OF DECISIVE ACTION. DOES THE CORPS OF ENGINEERS NEED TO RE-STRUCTURE ENGINEER CONSTRUCTION COMPANIES AGAIN IN ORDER TO SUPPORT DECISIVE ACTIONS?- by MAJ Samuel A. Escobar, 108 pages.

Decisive action by the United States Army places additional weight on construction units particularly in support of construction missions during offensive, defensive, stability or defense civil support authority (DCSA) operations, yet organic engineer capabilities have been reduced in the current and future company structure. The author examines the past, present and future engineer construction companies in support of unified land operations with emphasis on decisive action. This thesis will examine three different types of engineer units; the first unit is Legacy Construction Company (under FORCE XXI model), Echelon Above Brigade (EAB) modularity for construction companies broken down in two different formations (vertical and horizontal companies) and construction support company organization within the Brigade Combat Team Engineer organization. An additional focus will examine the capabilities that exist within Engineer construction companies, what responsibilities relies on these units in order to provide support for mobility, counter mobility, survivability and general engineering. The modularity within construction companies offers limited construction capability for Maneuver or support elements. The author examines current Army Universal Task Lists (AUTL) for each organization, review the Doctrine, Organization, Training, Materiel, Leadership, Personnel and Facilities (DOTMLFP) impacts as new structures develops and how units deployed in support of Decisive Actions converts to the old model in order to work efficiently. The author also recommends a third vertical platoon within the construction company inside the Brigade Combat Team Engineer Battalion (BEB), if changes are not implemented within the Echelon above Brigade Engineer units.

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## ACRONYMS

ACIDS	Army Capabilities Integration and Development System
ADC	Area Damage Control
AOR	Area of Responsibility
ARFORGEN	Army Force Generation
ASCC	Army Service Component Command
ASP	Ammunition Supply Point
ATN	Army Training Network
AUTL	Army Universal Task List
BCT	Brigade Combat Team
BEB	Brigade Combat Team Engineer Battalion
BSO	Battle Space Owner
BSTB	Brigade Special Troop Battalion
C2	Command and Control
CAB	Combined Arms Battalion
CBRN	Chemical, Biological, Radiological, Nuclear, High yield Explosive
CJTF	Combined Joint Task Force
COCOM	Combatant Command
COP	Company Outpost
CP	Command Post
DCSA	Defense Civil Support Authority
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities
EAB	Echelon Above Brigade



ECP	Entry Control Point
ERI	Engineer Restructure Initiative
FAA	Functional Area Analysis
FARPS	Forward Area Refueling Point
FEF	Future Engineer Force
FMSWEB	Force Management Website
FNA	Functional Need Analysis
FOB	Forward Operating Base
FOD	Foreign Object Damage
FSA	Functional Solutions Analysis
GE	General Engineering
HLZ	Helicopter Landing Zone
IBCT	Infantry Brigade Combat Team
JCIDS	Joint Capabilities Integration and Development System
JIIM	Joint, Interagency, Intergovernmental, Multi-National
LOC	Lines of Communication
LSA	Logistics Support Area
M/CM/S	Mobility /Counter-Mobility/ Survivability
MEB	Maneuver Enhancement Brigade
METL	Mission Essential Task List
MRBC	Multi-Role Bridge Company
MSR	Main Supply Route
MTOE	Modified Table of Equipment
OCUNUS	Outside of the Continental United States
OE	Operating Environment

OPCON	Operational Control
OPSEC	Operational Security
RC	Regional Command
RCP	Route Clearance Platoon
RSOI	Reception, Staging, Onward Movement, Integration
SBCT	Stryker Brigade Combat Team
TOE	Table of Equipment
TRADOC	United States Training and Doctrine Command
USACE	United States Army Corps of Engineers

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## CHAPTER 1

### INTRODUCTION

Americans have a lot to offer, so I've created a task force to develop additional ways people can get directly involved in this war effort, by making our homes and neighbourhoods and schools and workplaces safer. And I call on all Americans to serve by bettering our communities and, thereby, defy and defeat the terrorists.

— President Bush, Address to the Nation

#### Problem Statement

The new modular organization is already approved and being currently employed in the theater of operations such like Iraq and Afghanistan.<sup>1</sup> The Modular concept specifically for construction companies breaks outs or reorganizes the units into vertical and horizontal companies. Under the old legacy structure (Force XXI), one company consists of both vertical and horizontal assets. Even the modularity is the new way of fighting, the engineer reorganize their organizations into company teams in order to provide that right mix of capabilities. For example, the 19th Engineer Battalion task organization while deployed consisted of two vertical companies (76th Engineer Company and 60th Engineer Company), one horizontal company (15th Engineer), MRBC (502nd Engineer), one survey and design detachment (72nd Engineer), one well drilling detachment (269th Engineer) and three concrete detachments (538th Engineer, 655 Engineer and 122 Engineer). Based on mission, command and control requirements the Battalion determined that it would need to combine our horizontal and vertical units into company teams.<sup>2</sup> By structuring these companies separately (modularity), the unit cannot provide the essential capability to BCTs or other support units without organic engineer assets.

Construction companies have traditionally served as one of the main elements for maneuver commanders in order to preposition their units or supporting elements during decisive actions.<sup>3</sup> Such companies have been the link that ensures a successful transition is made through the lines of engineer support which is critical throughout any type of operations. The old legacy model in some ways provided the commander a solution to accomplish multiple engineer tasks within the lines of engineer support which continues to be critical throughout present and possibly future operations.

The new modularity concept, however, reduces capabilities and prevents the Corps of Engineers professionals from maintaining a multi-level or diverse organization. In this thesis, particular attention is given to command and support structure to identify shortfalls within aspects of Doctrine, Organization, Materiel, Leadership, Personnel and Facilities (DOTMLPF). Additional recommendations will be given on refining the conceptual structure to better support future operations. Additionally some measures of effectiveness are suggested for better tracking the progress of the engineer transformation and for structuring the engineer force at the company level.

#### Primary Research Question

The research question focuses on the force structure of engineer construction companies as part of force modularization. Does the corps of engineers need to re-structure engineer construction companies again in order to support decisive actions?

#### Secondary Research Questions

What limitations exist under the new structures? Can companies be deployed separately in support of decisive actions without requiring additional construction assets?

DOTMLPF concerns? Why choose this type of modularity? What is the “right” fit? Are combat heavy companies able to conduct full lines of engineer support to Brigade Combat Teams? What are the advantages and disadvantages of the new modularity versus the Force XXI task organization? How do these organizations support real and plus projected METL requirements? What kind of training will companies need if they have to merge to support future requirements?

### Background

The purpose of this thesis is to provide a general overview of engineer construction companies under the new transformation or modularity. This thesis will provide a look of the old legacy model (Force XXI-vertical and horizontal company) and Modularity which breaks into two different formations: vertical company and horizontal company. Lessons learned from past and present operations disclose the engineer capabilities commonly required during decisive actions. This thesis recommends a balanced construction company with horizontal, vertical. As mentioned before, engineer units have been used in hybrid<sup>4</sup> environments whether conventional or irregular warfare in the past decade. In support of the Global War on Terrorism and other operations, the engineer construction effort has been in constant demand. “The Engineer Regiment exists to provide freedom of action to ground forces. This has not changed since 16 June 1775. Over the past nine years (2001-2010), the Army’s focus has shifted away from major combat operations, its dominant concern throughout much of the 20th Century. Its focus is now firmly fixed on irregular warfare, with an increased emphasis on shaping civil operations. This has led to the addition of stability operations as a core mission for the



United States (U.S.) military, and has triggered a pervasive and transcendent shift within the Engineer Regiment. As a result, the Engineer.

Regiment finds itself supporting simultaneous combinations of offensive, defensive, and stability or civil support operations. It describes how engineers combine the skills and organizations within the three interdependent disciplines of combat, general, and geospatial engineering to provide support for ground force commanders to assure mobility of the force, enhance protection of the force, enable logistics, and develop infrastructure for afflicted populations and nations. It recognizes the new interdependence between operational force engineers and the U.S. Army Corps of Engineers (USACE), and how this new interdependence has provided greater synergy within the Engineer Regiment and enhanced its support to the Army, joint forces, multinational forces, and governmental agencies.”<sup>5</sup>

The engineer company modularity, as a concept, has great potential for efficiencies, but when is carried out, significant difficulties come into place with command and control, training, equipping and the mission set are stressed by distance, unfamiliar work relationships, untested doctrine, and offset deployment timelines. It has been proven throughout time that a company deploys Outside the Continental United States (OCONUS) to support operations mobilized independently from its parent unit. The Corps of Engineer has focused in the transformation of engineer units in the past ten years in order to support worldwide missions. According to the former Corps of Engineer Chief, LTG Van Antwerp, “the engineer regiment must change—now. The fact that we provide a unique set of core competencies that critically enable the Combatant Commander and the Joint Team with the mobility it needs to attain a position of

advantage at the tactical through the strategic level must not change. However, we must re-examine and challenge our most fundamental institutional campaign-quality, modular force with a Joint and Expeditionary Mindset in order to adapt to unforeseen circumstances that will occur in the future.”<sup>6</sup>

The Engineer Regiment supports three different tasks: combat, general engineering and geospatial engineering. “Combat engineering is the engineer discipline that is focused on supporting the maneuver of land combat forces while in close support to those forces. It consists of three types of capabilities and activities: mobility, counter-mobility, and survivability. General engineering is the engineer discipline that is focused on affecting terrain while not in close support to maneuver forces. Tasks that are most frequently performed under general engineering conditions include the construction, repair, maintenance, and operation of infrastructure, facilities, Lines of Communications (LOC), and bases; protection of natural and cultural resources; terrain modification and repair; selected explosive hazard activities; and environmental activities. These are the primary focus for general engineer units.

Geospatial engineering is the engineer discipline that is focused on applying geospatial information to improve understanding of terrain for military operations. Geospatial engineering focuses on applying information to improve the understanding of terrain, while general engineering focuses on affecting terrain”<sup>7</sup>

This thesis analyzes the engineer force structure and capabilities embedded in today’s Army Organizations but primarily in the typical Engineer or Maneuver Enhancement Brigade Structure. It addresses the ability to support decisive operations,

swiftly and continually transitioning between offense, defense or stability and DCSA operations.

The focus for this thesis is primarily the construction company reorganization as part of the transformation. The Legacy combat Construction Company as mentioned before consisted of two vertical construction platoons and one horizontal platoon. Modularity calls for separate capabilities of horizontal (separate) and vertical (separate) companies. For example, in Operation Enduring Freedom some construction Battalions had to reorganize companies back into Legacy Modified Table of Equipment (MTOE) in order to allow companies to accomplish missions throughout Area of Operation (AOR).<sup>8</sup>

To articulate how past and present units are laid out, the following charts will clearly show how engineer units were organized versus how are currently set up. In addition, it will indicate their mission based on their MTOE.

Under the old legacy model (Force XXI), the engineer company mission was to increase the combat effectiveness of Divisions, Corps, and the Army Service Component Command (ASCC) by accomplishing general engineering tasks and limited mobility, counter-mobility, and survivability tasks. This unit will also perform rear area security operations, to include Infantry combat missions as required.<sup>9</sup> This organization was able to accomplish the following tasks:

1. Provide two or three vertical platoons to Maneuver BCT or Support Brigade
2. Command, control and construct base camps, internment facilities  
(construction, repair, maintain vertical infrastructures)

3. Provide one horizontal platoon in order to conduct missions such as repair, maintain and construct air/ground LOC; emplace culvert, hauling, force protection, and limited clearing operations.

Historically, the Legacy Engineer Company (Force XXI) mission was to construct base camps, internment facilities; construct, repair, maintain vertical infrastructures in support of Support Brigade of Engineer Brigades. Since this type of organization was able of conducting horizontal construction, the company had the capability to provide personnel and equipment to perform engineering tasks such as clearing and grubbing operations; haul, grade, shape, compact, cut and fill materials; emplace culverts; remove snow or ice; construct drainage structures; conduct borrow pit operations; provide dust control operations; construct base camps; air landing platforms, Forward Aiming and Refueling Point (FARPS), supply routes, roads, control points, fire bases, tank ditches, Ammunition Supply Point (ASPs), and field hospital platforms; prepare river crossing sites; and support port repair due to Hydraulic Excavator (HYEX), provides force protection.

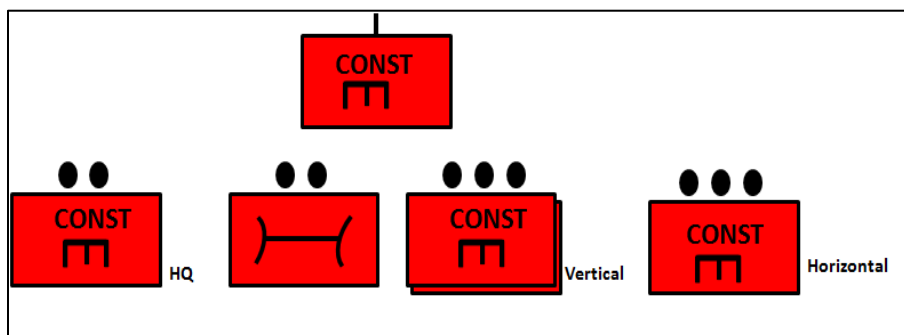


Figure 1. Engineer Construction Company (Combat) (Heavy) Legacy Force XXI Organization

Source: U.S. Army Force Management Support Agency, FMSWeb, <https://fmsweb.army.mil/>.

Under the modularity concept, the construction capabilities are broken out in two categories: vertical company and horizontal company. The horizontal construction company provides command and control of Engineer effects platoons that are necessary to conduct missions such as repair, maintain, construct air/ground LOC; emplace culverts; hauling; force protection; and limited clearing operations. This company has the capability to provide Command and Control (C2) for three to five platoons as an engineer team, to provide personnel and equipment to perform engineering tasks such as clearing and grubbing operations; haul, grade, shape, compact, cut and fill materials; emplace culverts; remove snow or ice; construct drainage structures; conduct borrow pit operations; provide dust control operations; construct base camps; air landing platforms, FARPS, supply routes, roads, control points, fire bases, tank ditches, ASPs, and field hospital platforms; prepare river crossing sites; and support port repair due to HYEX, provides force protection. Meanwhile, the vertical company mission is to command, control and construct base camps, internment facilities; construct, repair, maintain vertical infrastructures in support of Support Brigade of Engineer Brigades. This company has the capabilities of: command, control and oversight of three to five platoons, capable of providing three vertical platoons to Maneuver Brigade Combat Team (BCT) or Support brigade.<sup>10</sup>

Under the modular concept the various capabilities are broken out in different formations. This may prevent them from fully supporting maneuver or other units. Thus, there is a possibility that the Corps of Engineer may lose total effectiveness because modularity could prevent the organization from operating independently and in full

support of a Maneuver Enhancement Brigade (MEB) or Construction Effects Battalions.

The following diagram shows the conversion of construction companies.

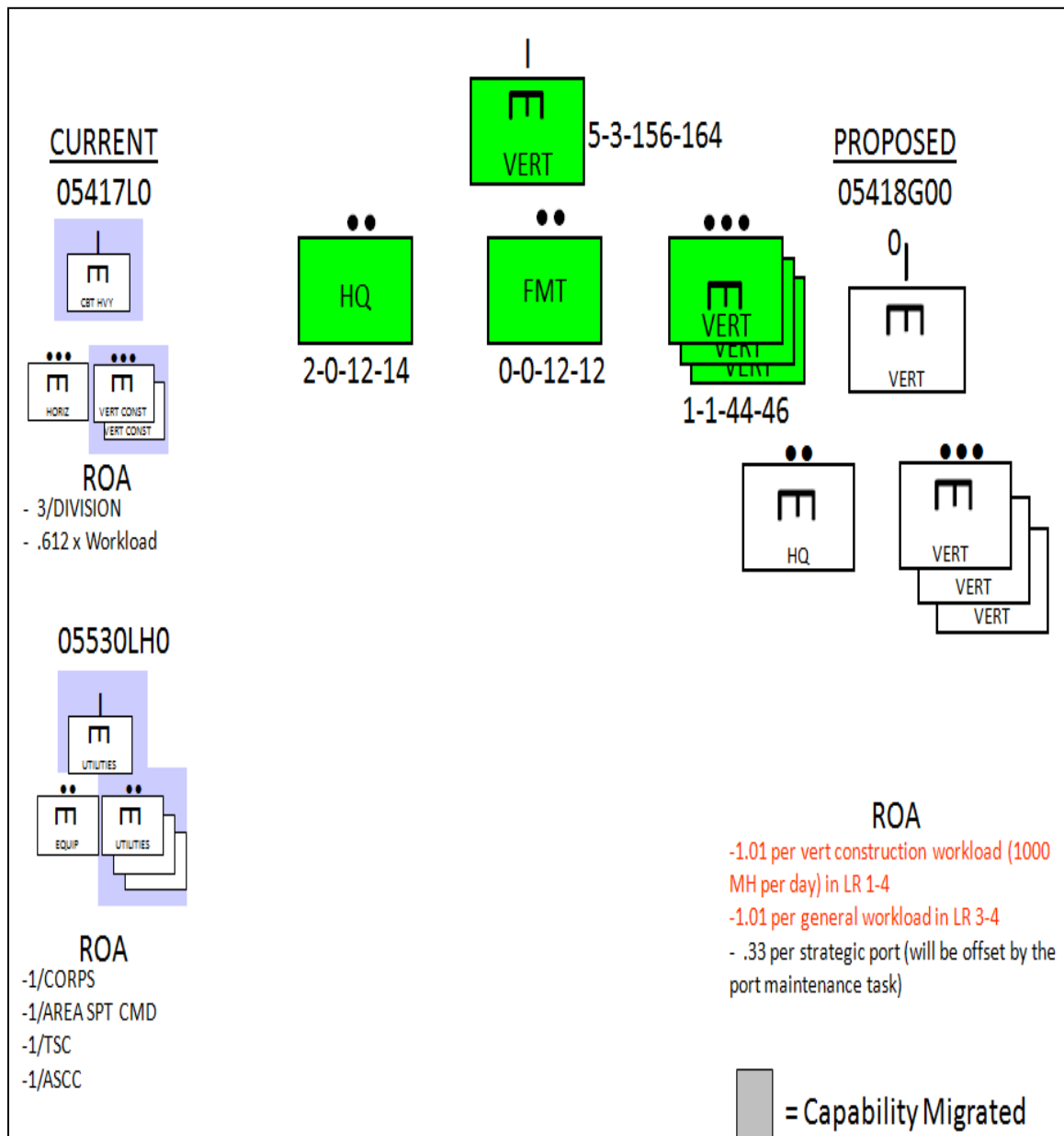


Figure 2. Vertical Construction Company (Modularity)

Source: U.S. Army Force Management Support Agency, FMSWeb, <https://fmsweb.army.mil/>.

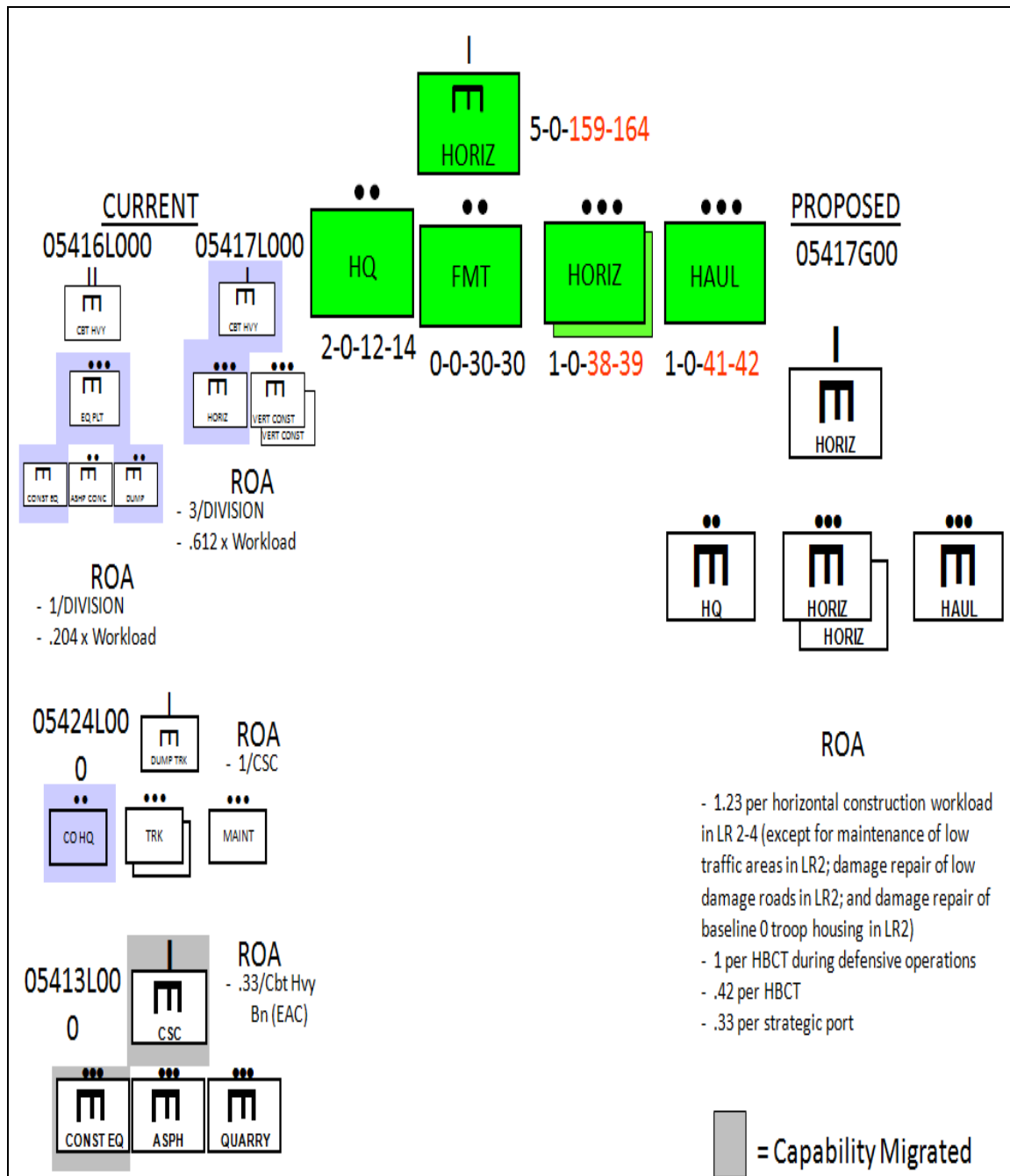


Figure 3. Horizontal Construction Company (Modularity)

Source: U.S. Army Force Management Support Agency, FMSWeb, <https://fmsweb.army.mil/>.

### Significance

“The Engineer Regiment exists to provide freedom of action to ground forces and to free these forces from the effects of the enemy and all aspects of the terrain. Baseline engineer units include both combat and general engineer units. General engineer companies are the primary building block for construction effects battalions . These units may augment the organic engineer capabilities of a BCT, or they may be task-organized under an engineer battalion headquarters to provide specific tailored capabilities to echelons above brigade (EAB).”<sup>11</sup> Engineer company commanders should Maintain enough flexibility to properly train, resource and support any level of construction operations. The integrity of one formation which contains both vertical and horizontal construction capabilities will very likely be crucial in order to successfully conduct offensive, defensive and stability operations.

Army engineer support to operations encompasses a wide variety of actions requiring many capabilities. Commanders in general employ engineers in all elements of decisive action in any operational environments. Commanders must have the flexibility to employ engineers in mobility, survivability, logistics and general engineering support (developing infrastructure) operations. Therefore, engineers must maintain both capabilities vertical and horizontal should they need to execute company–level operations.

### Limitations

The only limitation is the doctrinal change as the result of operations in support of Decisive Action. As doctrine and organizations continues to evolve, this thesis may change as well with the new transformation of engineer units at the brigade combat team



(BCT) level and the Echelon Above Brigade (EAB) construction effects battalions. As the new ADP 3-0 emerges, all other FMs may become outdated as the author continues to evaluate and assess doctrinal terms.

### Delimitations

Since this thesis analyses recent events, there is no a large pull of AAR database that can assist in the evaluation of current and future structures. Additionally, the author does not have the time to conduct extensive or quantitative research involving a wide spectrum of DOMLPF processes. This research will cover the reasons why these companies have to operate in individual functionality in support of combat operations. However, even this thesis is being written where a construction operation in Afghanistan continues to evolve and information may not be yet available for research. The investigation will cover the following: why the transformation was essential, pros and cons, how do we support future construction operations.

### Assumptions

The information provided through this thesis will help the Engineer Regiment to re-evaluate the MTOE approved as part of the new transformation of engineer units. The finding of this research could be taken in consideration as we conduct an in-depth analysis of our engineer structure in the U.S. Army.

### Definitions and key terms

The following will be used throughout the study.

The Brigade Combat Team (BCT). Is an organization that provides the division, land component commander (LCC), or joint task force (JTF) commander with close

combat capabilities. BCTs are designed for operations encompassing the entire spectrum of conflict. They fight battles and engagements by employing tactical advantages of a combined arms force structure. They accomplish their missions by integrating the actions of maneuver battalions, field artillery, aviation, engineer, air and missile defense, close air support, and naval gunfire.<sup>12</sup>

Brigade Engineer Battalion (BEB): The BEB concept re-establishes an engineer battalion in each BCT. In the Heavy Brigade Combat Team and Infantry Brigade Combat Team formations, the BSTB is converted to an engineer battalion. In the Stryker BCTs, an engineer battalion is formed. The BCT gets additional engineer capability by migrating engineer structure from the EAB force pool into the BCTs. The end result is that each BCT will have an organic engineer battalion. The engineer battalion will have two engineer companies, a signal company, a military intelligence company, a military police platoon and a CBRN platoon. One engineer company will be a combat engineer company and the other will be a construction company. With these two companies, the BEB will be able to provide a baseline engineer capability for conducting full spectrum operations.<sup>13</sup>

Brigade Special Troops Battalion (BSTB). Provides command and control to the BCT headquarters and headquarters company (HHC), Engineer Company, Military Intelligence Company, brigade Signal Company, military police platoon, and CBRN reconnaissance platoon of the HBCT. It is responsible for the security of all BCT command post (CP) and can, on order, plan, prepare, and execute security missions for areas not assigned to other units in the Brigade area of operations.<sup>14</sup>

Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities (DOTMLPF). The DOTMLPF analyzes the proposed organization or change to an organization for doctrinal correctness. This phase provides a forum for the entire Army to review the issue while linking the capabilities, materiel, training and document developers together. When DOTMLPF analysis is performed, and a new or improved organization is selected as the best solution, the capability development communities in TRADOC or other proponents document proposed organizations or modification to the existing organization on a unit reference sheet (URS).<sup>15</sup>

Echelons Above Brigade (EAB). Supports the force structure needed to make the brigade of the “operating force” successful in the MCO and define the required “generating” forces necessary to support and sustain the “operating forces.” The specified combat forces and the EAB support forces determined during the total Army Analysis (TAA) process as referred to as “operating force.”<sup>16</sup>

Force XXI Structure: Army and TRADOC planners saw Force XXI - the Army to emerge between 2000 and 2010 - as a distinct change from the force as it was configured in the 1990s. They saw it as a new departure—an Army with a flexible engagement strategy structured in 21st century technology, knowledge-based, and built on capability, not threat projections. Its lethality, survivability, and operational tempo all would markedly increase. Shared "situational awareness" by its leaders and soldiers and real-time battlefield information would transform its offensive and defensive power.

Full Spectrum Operations (FSO) (FM 3-34). Decisive action replaces FSO. Full spectrum operations are purposeful, continuous, and simultaneous combinations of offense, defense, stability or civil support to dominate the military situation at operational

and tactical levels. The Engineer Regiment is organized and equipped to respond to the broad range of full spectrum operations. In spite of this, engineers can expect serious challenges in the operating environment (OE) when trying to execute General Engineering tasks. A lack of resources—to include equipment, personnel, and logistics—may severely impede the commander from executing all necessary tasks, and careful prioritization must occur.

1. Offensive Operations: assured mobility support all the forms of offensive maneuver including the envelopment, turning movement, penetration, infiltration, frontal attack. The general Engineering tasks include: Constructing and repairing roads and combat trails used as supply routes, ensuring theater access through the construction and upgrade of ports, airfields, and reception, staging, onward movement, and integration (RSO&I) facilities, including the repair of paved, asphalt, and concrete runways and airfields as part of forward aviation combat engineers, installing assets that prevent foreign object damage (FOD) to rotary wing aircrafts, constructing tactical and LOC bridging, conducting area damage control (ADC) missions that support the mobility of the maneuver force, constructing internment and resettlement (I/R) facilities.

2. Defensive Operations: the primary focus for engineers is on combat engineering to enable combined arms obstacle integration and assured mobility to friendly repositioning or counterattacking forces, GE tasks will play an important role. Tasks include: constructing hardened facilities that protects the force from enemy artillery and air attacks, reinforcing combat engineering effort in mobility,

countermobility and survivability (M/CM/S), constructing and repairing of routes that facilitate the repositioning of forces throughout the Area of Operation (AO)

3. Stability Operations: general engineering tasks primarily focus on the reconstruction or establishment of services that support the population in conjunction with civilian agencies in addition to their normal support of U.S. forces. Engineers conducting these missions provide resources to assist in disaster or theater response in areas outside U.S. territory. Likely missions include: base camp and force bed-down facility constructions, survivability and other protection support, robust support area facilities, infrastructure support, power generation and distribution facilities that are reliable, LOC construction, maintenance and repair.

Lines of Engineer Support (FM 3-34). Lines of Engineer Support are defined to assure mobility, enhance protection, enable logistics, develop infrastructure.

1. Assure Mobility: the line of support is the orchestrating of combat engineering, general engineering and geospatial engineering capabilities in combination in order to allow the commander to gain and maintain a position of advantage against an enemy. This includes denying the enemy freedom of action to attain his own position of advantage. This line supports mobility and counter mobility operations.

2. Enhance Protection: this line of support is the combination of the engineer disciplines in order to support the preservation of the force so the commander can apply maximum combat power. This line of engineer support consists largely of survivability tasks, but also can include selected mobility tasks (for example,

construction of perimeter roads), and counter mobility tasks (for example, emplacement of protective obstacles), and explosive hazard operation tasks. This line supports survivability operations.

3. Enable logistics: engineers combine capabilities from all three engineer disciplines to enable the movement and support of forces. This line consist largely of building, repairing, and maintaining roads, bridges, airfields, and other structures and facilities needed for aerial port of debarkation (APODs), seaport of debarkation (SPODs), main supply routes (MSRs), and base camps.

4. Develop Infrastructure: Engineer combine capabilities from across all three disciplines to support the improvement of civil conditions, which are vital to stability and civil support operations. This line consists primarily of building, repairing, and maintaining various infrastructure facilities, providing essential services, and more importantly, improving host nations (HN) capabilities for perform such tasks.

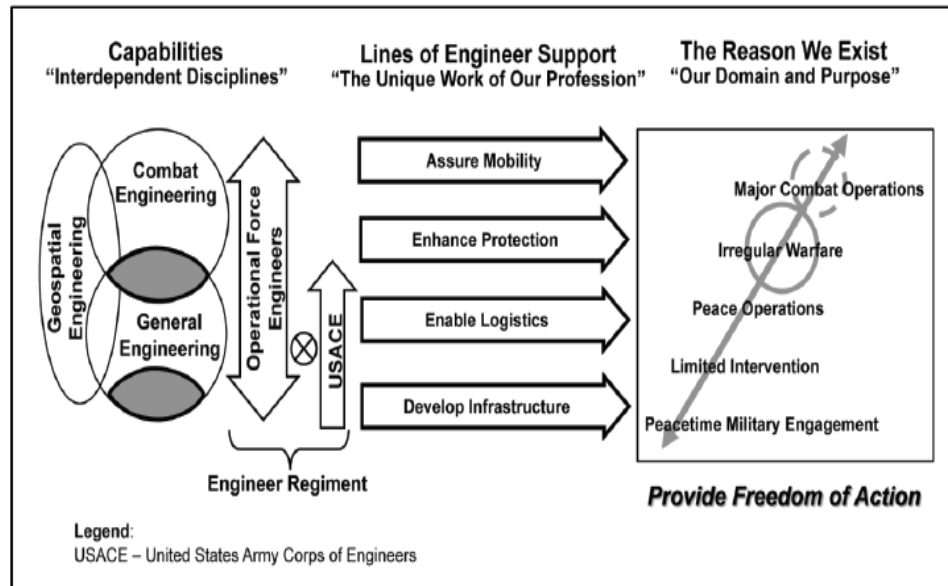


Figure 4. Lines of Engineer Operations

Source: Department of the Army, Field Manual (FM) 3-34, *Engineer Operations* (Washington, DC: Government Printing Office, 2011).

M/CM/S (FM 3-34): Mobility, counter mobility and survivability.

Modified Table of Organization and Equipment (MTOE). An Army Unit MTOE prescribes the normal mission, organizational structure, and personnel and equipment requirements for a military unit and is the basis for an authorization document.<sup>17</sup>

Table of Organization and Equipment (TOE). Is a document published by the U.S. Department of Defense which prescribes the organization, staffing, and equipping of units. Also used in acronyms as "T/O" and "T/E." It also provides information on the mission and capabilities of a unit as well as the unit's current status. A general TOE is applicable to a type of units rather than a specific. In this way, all units of the same branch (such as Infantry) follow the same structural guidelines.<sup>18</sup>

United States Training and Doctrine Command (TRADOC). “Training and Doctrine Command develops, educates and trains Soldiers, civilians, and leaders; support unit training; and designs, builds and integrates a versatile mix of capabilities, formations, and equipment to strengthen the U.S. Army as America’s Force of Decisive Action.”<sup>19</sup>

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<sup>1</sup>Task Organization and Equipment Unit Reference Book, January 2011. Chapter 9 (Engineer). This reference provides detailed descriptions of Chemical, Engineer and Military Police force structure to include elements in Echelons above Brigade (EAB) and within HQ Elements of the Corps, Division and Brigade Combat Teams (BCT). The purpose is to assist commanders, staffs and subordinates in better understanding maneuver support unit capabilities and in effectively employing their capabilities to support the maneuver commander’s intent.

<sup>2</sup>AAR from the 19th Engineer Battalion–LTC Roscoe, 17 April 2010, Afghanistan.

<sup>3</sup>Army engineer support to operations encompasses a wide range of actions requiring many capabilities. Commanders use engineers in all elements of decisive actions and in all operational themes across the spectrum of conflict. They use them primarily to assure mobility, enhance protection, enable logistics, and develop infrastructure.

<sup>4</sup>Hybrid Threat: is the diverse and dynamic combination of regular forces, irregular forces, criminal elements, or a combination of these forces and elements all unified to achieve mutually benefitting effects. Hybrid threats combine regular forces governed by international law, military tradition, and custom with unregulated irregular forces that act with no restrictions on violence or their targets. These forces could include militias, terrorists, guerillas, and criminals.

<sup>5</sup>*Operation Engineer Freedom*, Joint Engineer Operations (August 2010)–Initial Impressions Reports.

<sup>6</sup>LTG Van Antwerp, Message from the Army Corps of Engineer Chief, FEF White Pages (ENFORCE) 2004.

<sup>7</sup>Department of the Army, Field Manual (FM) 3-34, *Engineer Operations*. (Washington, DC: Government Printing Office, 2011).

<sup>8</sup>864th Engineer Battalion and 19th Engineer Battalion deployment After Action Review.



<sup>9</sup>U.S. Army Force Management Support Agency, FMSWeb, <https://fmsweb.army.mil/>.

<sup>10</sup>U.S. Army Maneuver Support Center of Excellence, *Manuever Support Table of Organization and Equipment Book* (Ft Leonard Wood, MO: 2008), Engineer Transformation, Chapter 9

<sup>11</sup>Department of the Army, FM 3-34.

<sup>12</sup>Department of the Army, Field Manual (FM) 3-90.6, *The Brigade Combat Team* (Washington, DC: Government Printing Office, September 2010).

<sup>13</sup>U.S. Engineer School and Regiment, 24 August 2010.

<sup>14</sup>Department of the Army, FM 3-90.6.

<sup>15</sup>The Army Total Analysis (TAA) and How the Army Runs, n.d.

<sup>16</sup>*Ibid.*

<sup>17</sup>U.S. Army Force Management Support Agency, FMSWeb.

<sup>18</sup>*Ibid.*

<sup>19</sup>Training and Doctrine Command, “About TRADOC,” <http://www.tradoc.army.mil/About.asp> (accessed May 2012).

## CHAPTER 2

### LITERATURE REVIEW

It takes time to build a force and it takes time to change, adapt and modernize one as well.

— Donald Rumsfeld, 2003

Many writings treat the topic of modularity and the issue of engineer support embedded in the Army's brigade combat team or supporting engineer brigade structure. Understanding that the engineer companies support different structures, this thesis will focus primarily engineer brigade structure. In 2009, the Maneuver Center of Excellence developed the concept of Brigade Engineer Battalion (BEB). This concept of the BEB is to replace the BSTB in the Heavy and Infantry BCT with an engineer battalion and form an engineer battalion organic to the SBCT. Echelon above brigades (EAB) engineer formations are also migrated down to the BCTs to provide capabilities that include assault bridging, breaching, route clearance, and both horizontal and vertical construction.<sup>1</sup> The solution for an Engineer Battalion under the BCT has already been proposed and approved; however, this thesis focuses specifically on construction companies assigned to an Engineer Brigade.

This literature will be divided in six different categories:

1. After Action Reviews for Engineer units deployed to Afghanistan between 2000-2011
2. Professional writing discussing Engineer Transformation
3. Monographs and thesis about engineer missions in Iraq and Afghanistan

4. Interviews already conducted to former battalion commanders deployed to Operation Enduring Freedom
5. Military doctrine and other documents defining the operational environment and engineer functions in support of decisive actions.
6. Documents about the new Brigade Engineer Battalion (BEB) in support of the Brigade Combat Team which replaces the Brigade Special Troops Battalion (BSTB)

#### After action Reviews for Engineer Units Deployed to Iraq and Afghanistan

##### 864th Engineer Battalion

The 864th Engineer battalion stationed at Fort Lewis has been supporting the war effort of both Iraq and Afghanistan since 2003. Their primary mission is to conduct general engineering operations in support of BCTs or EAB.<sup>2</sup> “In March 2003, the 864th Engineer Battalion deployed to Kuwait in support of Operation Enduring Freedom and Operation Iraqi Freedom. The Battalion supported V Corps in the attack to liberate Iraq and during post-hostilities conducted extensive airfield construction and general engineering in support of CJTF-7 Operations earning the Meritorious Unit Citation. The Battalion redeployed on 20 February 2004 to Fort Lewis, Washington. In March 2005, the 864th Engineer Battalion deployed to Afghanistan in support of Operation Enduring Freedom VI and worked on road projects around the Kandahar region in support of Combined Joint Task Force-76 (CJTF-76). The Battalion earned the Valorous Unit Award for its contributions to Coalition forces specifically on road projects in the Kandahar and Paktika Provinces, as well as many forward operating bases (FOB) improvements. The 864th Engineer Combat Battalion (Heavy) returned to Fort Lewis,

Washington on 26 March 2006 and swiftly began preparing for Operation Enduring Freedom 2006-2008. In November 2006, the Battalion deployed to Afghanistan and served an 18-month deployment and successfully completed many missions that included: road construction, FOB expansions, low water crossings and culvert improvement. The battalion built K-spans,<sup>3</sup> repaired bridges, built combat out posts along the Afghanistan-Pakistan border, and conducted many humanitarian missions that helped villages throughout Eastern Afghanistan. In May 2008, the Battalion redeployed to Fort Lewis and immediately began their transformation into the new modular Army. The Battalion formally completed their transformation in 16 October 2008. As part of this transformation, the Battalion inactivated its organic A, B, and C Companies, reorganized its Headquarters Support Company as a Headquarters and Headquarters Company, and activated an organic Forward Support Company. The 577th, 585th, and 617th Engineer Companies were subsequently assigned to the Battalion. The Battalion remained assigned to the reorganized and re-designated 555th Engineer Brigade.”<sup>4</sup>

In 2011, the Maneuver Center of Excellence conducted an AAR in regards to their latest deployment to Afghanistan. The unit was deployed to Regional Command-South (RC-S) in support of general engineering operations. The battalion deployed task organization was as follows:

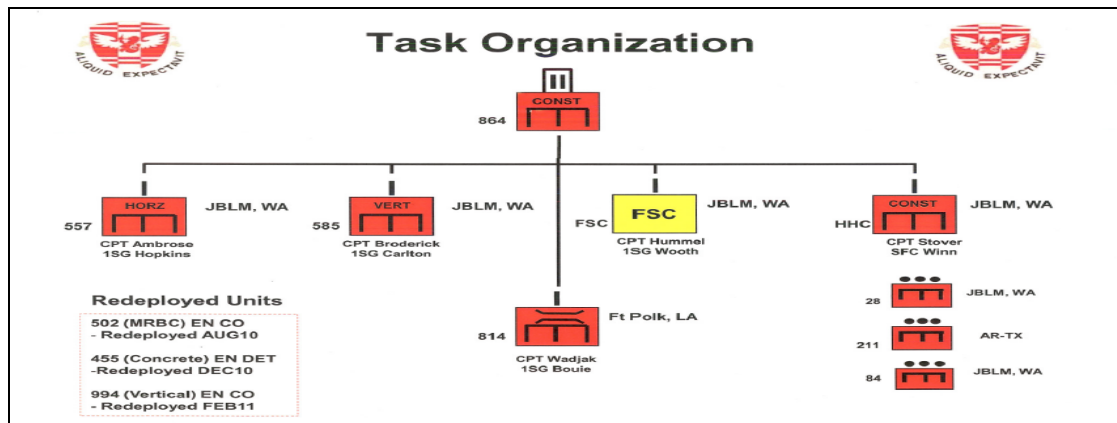


Figure 5. 864th Engineer Battalion Task Organization

*Source:* 864th Engineer AAR–Engineer School Center of Excellence.

The battalion consisted of a Headquarters and Headquarters company (HHC), two vertical construction companies, and one Horizontal Construction Company, one Multi-Role Bridge Company (MRBC), one Concrete Detachment and one Forward Support Company (FSC). The AAR indicates that their MTOE task organization had to be broken out under the old Force XXI structure (company team) in order to be able to conduct surge infrastructure (FOB Expansion and new FOB build) and surge operations (the Kandahar City SRPF<sup>5</sup>–check points with logistic support areas (LSA) and tactical Infrastructure and expansion in support of 2-101 IBCT, 1-4 HBCT, Task Force Kandahar–Canadian Regiment).<sup>6</sup> As part of this requirement, vertical and horizontal companies merged into company teams as show in figure 6. Per the AAR, “two companies were formed to have a mix of Horizontal and Vertical assets at the company level (similar to the old Combat Heavy Battalion Company Structure).<sup>7</sup>

As 864th Engineer reconfigure their forces, they were able to complete 11 Forward Operating Bases (FOBs) and 12 company Outposts (COPs). Additionally, they

completed 11 security points/positions, six watch tower, one blocking position, over 32 kilometers (kms) of route work effort (construction, repair, or upgrades), 10 bridges emplacements, eight bridge removals, 26 stand alone buildings, 123 guard towers and conducted multiple emergency repairs. In total there were over 75,000 square feet of office space. The battlaion built enough space to accommodate over 5,000 beds, while using 2.5 million cubic meters of gravel, 2.37 million board feet of lumber, 23 miles of HESCO<sup>8</sup> walls for force protection, 1 miles of concrete barriers and 970 trusses. In order to accomplish these missions the battalion went from modular structure back to legacy organizations by providing a good mix of vertical and horizontal capability to each company.

The following figure provides a representation of how the 864th Construction Effects Battalion was task organized their units throughout operations in support of Operation Enduring Freedom.

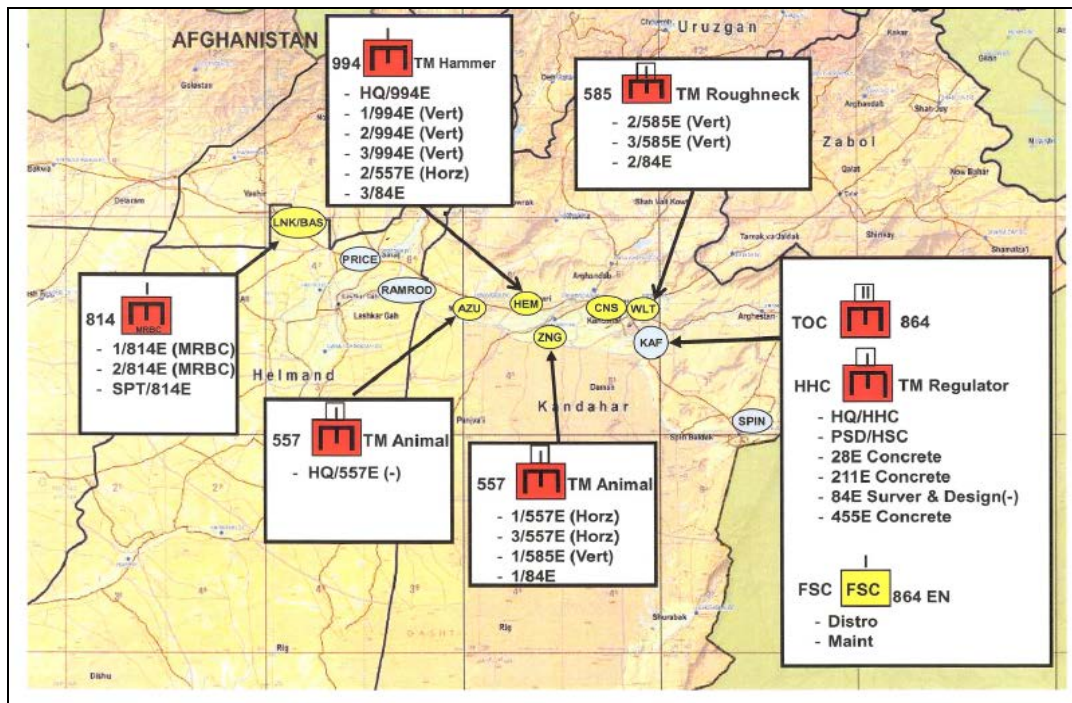


Figure 6. 864th Engineer Battalion Task Organization operating in Afghanistan under Legacy (Force XXI) organization

Source: 864th Engineer AAR–Engineer School Center of Excellence.

### 19th Engineer Battalion AAR

“The 19th Engineer Battalion while deployed was tasked organized with two vertical companies, one horizontal company, one MRBC, one survey and design detachment, one well drilling detachment (269E) and three concrete detachments with similar organization as the 864th Engineer Battalion. Based on mission and C2 requirements the Battalion determined that would need to combine our horizontal and vertical into company teams. These teams were tailored to the mission, but generally reverted back to the old legacy model Combat Heavy Company of two Vertical platoons and one Horizontal platoon—you can not start vertical work until the ground has been

prepped by the horizontal. We also created three identical horizontal platoons, not conforming to the horizontal company MTOE.”<sup>9</sup>

As LTC Roscoe (former Battalion Commander) indicated that the unit’s task organization consisted of two verticals and one horizontal company teams. “This enhanced a good mix of engineer construction capabilities to accomplish the missions needed to expand or build Forward Operating Bases (FOBs) or Combat Out-Posts (COPs). Because the Battalion’s survey and design detachment was over strength, the unit was able to break out three teams to embed with the company teams with a complete set of equipment to support the construction—this was a combat multiplier in keeping projects moving and not having to have a team fly out from the Battalion. The Battalion still retained two teams from the S&D detached to support other missions or surge when needed.”<sup>10</sup> Having the increased command and control (C2) with regard to equipment and personnel needs to be sustained in the modular Battalion headquarters (HQ).

Another major concern by 19th Engineer was property accountability and maintenance. The task organization allowed the companies to accomplish general engineer tasks at their location. But ideally the unit will task organize prior to the deployment and allow the new company teams to train together. However, this is unlikely, and units should focus on building the teams as quickly as possible in country. Since the task organization occurred after the deployment the company’s property was split between two and three FOBs greatly increasing issues with property accountability. As the deployment progressed, the ballalion realized the task organization would not change the company property books were scrubbed and that the Theater Provided Equipment was still realigned with the company team. Additionally the commanders for



the Horizontal company was responsible for signing property of equipment in multiple locations.

As the new modularity calls for separate organizations (vertical and horizontal companies) the maintenance support changes as well since vertical companies do not require a heavy footprint for maintenance operations. As the 19th Engineer Battalion changed their task organization in order to support operations in Afghanistan. The vertical company maintenance sections are not resourced to support heavy engineer equipment and the horizontal company maintenance section is not big enough to support three separate sections. The Battalion struggled with maintenance because of this and its shortage of mechanics across the entire unit. Maintenance of overused and old equipment is a large challenge when forward deployed in theater. This requires the unit to work overtime to keep equipment in the fight.<sup>11</sup>

#### 27th Engineer Battalion (Combat) (Airborne)

The 27th Engineer Battalion primary mission is to conduct mobility and counter mobility operations with very limited construction capabilities. However in 2010, the battalion was deployed to Afghanistan in support of route clearance operations. One of the main concerns to be addressed in this thesis is how to operate as multifunctional engineers. The main issue was that multifunctional engineer battalions must provide full spectrum Engineer capabilities in support of the current operational environment. As part of the discussion—today's engineers must be multifunctional with both capabilities and the C2 structure to provide both combat and construction effects in support of battle space owner. Engineers must synchronize route clearance, road repair, bridging and

security to assure mobility; single focus units do not have all the capabilities to execute mission without augmentation.<sup>12</sup>

Battle Space Owners (BSO) should not have to coordinate with more than one engineer battalion to synchronize support for a simple mission (movement of vertical or horizontal assets to support a COP build). Engineer units require greater internal construction capability to support facilities construction and power generation to support today's modern communications and digital system.

This comment by commanders of 27th Engineer proves a vital point when it comes to considering the unity of effort of construction effects units specifically at the company level. A single construction company needs to be able to have organic elements such as vertical, horizontal and utility rather coordinating with different elements to get such support for BSOs. This thesis will assess how EAB units (primarily Construction Companies) should be task organized (organically) in order to provide the right effort. Perhaps the so called "legacy" Force XXI structure is the appropriate to utilize in support of construction operations during decisive actions.

### Doctrinal Concepts

ADP 3-0, *Operations* is the main doctrinal manual for Unified Land Operation and currently replaces the old FM 3-0. Unified Land Operations provides the operational concept and picture for future Army and Joint Operations. This doctrine applies JIIM (Joint, Interagency, Intergovernmental and Multi National partners). This doctrine also utilizes the new term of decisive action which replaces full spectrum operations which describes offense, defense, stability and defense civil support authority (DCSA). This regulation will serve as one of the primary foundations to this thesis. As GEN Ordierno

states, “ADP 3-0 serves as the common operational concept for the Army. The central idea, adapted to the unique conditions of each conflict, represents the Army’ unique contribution to unified action. It must permeate our doctrine, our training, and our leader professional development programs”<sup>13</sup>

FM 3-34 considered as the Engineer bible describes the main role of engineer forces in support of Decisive Action. This regulation still operates under the old concept of Full Spectrum Operations; however, the basic foundation of engineer during offense, defense, stability and defense civil support authority remains essentially unchanged. This FM is aligned with ADP 3-0 as well as aligns with the other engineer manuals. FM 3-34 introduces an updated doctrinal framework of the Engineer Regiment and discusses the roles of engineer forces is combined with a set of skills and organizations to support decisive actions. The three main disciplines of engineers are considered as combat, general construction and geospatial engineering. This thesis is not intended to focus on geospatial engineering; however, it will discuss the capabilities of combat and construction in support of ADP 3-0.

Managing Army Changes (How the Army Runs): Understanding the strategic concepts of how the Army Runs will help the author gain knowledge of how new units could be generated as the Army continues to transformed in the 21st century. Understanding the threat as well as how economic changes impact, globalization, technology and other factors can impact all the way to the tactical level is critical. The author will utilize the DOTMLPF concept in order to gather shortfalls and identify gaps within our current or future engineer construction structure. As stated in Managing Army Change, “the Army Vision and joint identified capability gaps, derived from national

security directives and from OSD policy, lead to corresponding and support capabilities-based assessment process that parallels Joint Capabilities Integration and Development Systems (JCIDS).” In addition, “the Army Capabilities Integration and Development System (ACIDS) processes of functional area analysis (FAA), functional need analysis (FNA) and functional solutions analysis (FSA), resulting in both refining DOTMLPF analysis and recommended solutions.”<sup>14</sup>

There are three main phases which will serve as the focus for this study:

Phase 1: Developing capabilities

Phase II: Designing Organization

Phase III: Developing Organizational Models

In how the Army runs, the Army Force Management utilizes a table that will help the reader understand the potential challenges on transforming forces (process) and the possible gaps to identify as chapter 4 develops.

Phase 1–“TRADOC Army Capabilities and Integration Center (ARCIC) assesses the future war- fighting concepts through a series of analysis, tests, experiments, and studies to gain insight across DOTMLPF.”<sup>15</sup>

Phase 2–“If DOTMPLF solution develops in the “Develop Capabilities” section is a recommended organizational solution, the “Design Organization” phase is initiated. The Design Organization phase analyses the proposed organization for doctrinal correctness.”<sup>16</sup>

Phase 3–“of the Army Force Development Model transitions organizational development responsibilities from the TRADOC world to the DA G3.”<sup>17</sup>

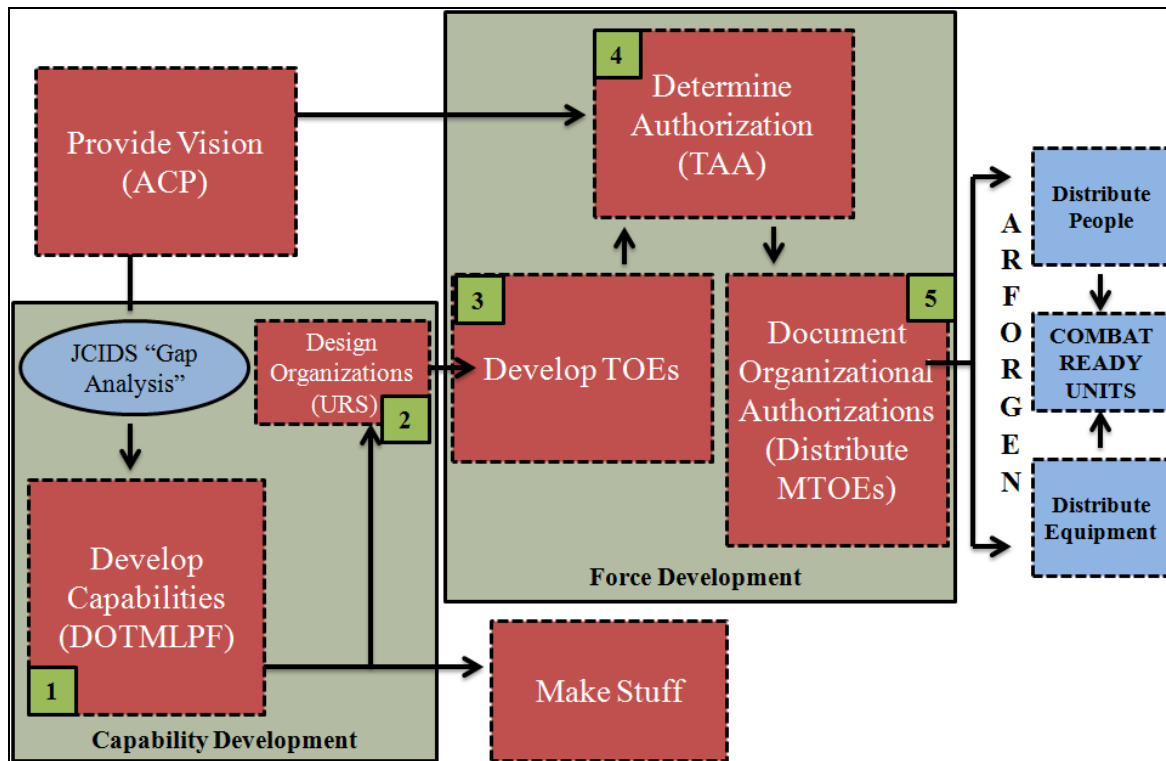


Figure 7. How the Army Runs

Source: U.S. Army Command and General Staff College, F100, *Managing Army Change* (Fort Leavenworth, KS: Government Printing Office, 2010).

<sup>1</sup>BCT Engineer Battalion concept (BEB)–White Pages, 10 February 2011.

<sup>2</sup>Globalsecurity.org, “864th Engineer Battalion,” <http://www.globalsecurity.org/military/agency/army/864eng.htm> (accessed May 2012).

<sup>3</sup>K-SPAN building (pre-engineered metal building) is a new form of construction utilized by the Armed Forces as storage and/or living facilities.

<sup>4</sup>Globalsecurity.org, “864th Engineer Battalion.”

<sup>5</sup>SRPF: Security Ring Protection Force construction projects IOT secure key terrain areas within a city.

<sup>6</sup>864th Engineer Battalion After Action Report from Operation Enduring Freedom 2010-2011.

<sup>7</sup>Ibid.

<sup>8</sup>HESCO bastion is both a modern gabion used for flood control and military fortification. It is made of a collapsible wire mesh container and heavy duty fabric liner, and used as a temporary to semi-permanent dike or barrier against blasts or small-arms.

<sup>9</sup>19th Engineer Battalion AAR, Afghanistan, July 2010.

<sup>10</sup>Ibid.

<sup>11</sup>19th Engineer Battalion AAR—Maintenance concerns while unit conducted construction operations in Afghanistan, April 2011.

<sup>12</sup>27th Engineer Battalion AAR, Afghanistan, February 2011.

<sup>13</sup>Department of the Army, ADP 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, 2011).

<sup>14</sup>U.S. Army Command and General Staff College, F100, *Managing Army Change* (Fort Leavenworth, KS: Government Printing Office, 2010).

<sup>15</sup>Ibid.

<sup>16</sup>Ibid.

<sup>17</sup>Ibid.

## CHAPTER 3

### RESEARCH DESIGN

The previous chapter reviewed the pertinent literature and this chapter will provide the research methodology to the writer used in chapter four. This thesis will seek to answer the primary and secondary questions presented in the first chapter. To do this, the thesis analyzes the engineer force structure and capabilities embedded in today's Army Organizations but primarily in the typical Engineer brigade or Maneuver Enhancement Brigade Structure. It addresses the ability to execute decisive operations, swiftly and continually transitioning between offense, defense or stability or DCSA operations. The primary research question asks, force structure of engineer construction companies as part of force modularization. Does the corps of engineers need to re-structure engineer construction companies again in order to support decisive actions?" The secondary questions are: Does the engineer have the necessary organic engineer construction organization in order to execute decisive action in today's environment, what limitations exist under the new structures? Can companies be deployed separately in support of decisive actions without requiring additional construction assets? Shortfalls identified utilizing some aspects of DOTMLPF? Why choose this type of modularity? What is the "right" fit? Are combat heavy companies able to conduct full lines of engineer support to Brigade Combat Teams? What are the advantages and disadvantages of new modularity versus Force XXI task organization? How do the METL compare? What kind of training will companies need if they have to merge to support future requirements?

The research question and the available information determines the research method past and current construction engineer units effectiveness in support of Decisive Action based on structure, equipment, and skill sets available to provide the capabilities of construction mission (clear, hold, build, and sustain success). This chapter will describe the research methodology utilized to answer the primary question whether legacy, current and future construction engineer units have the adequate capability to support decisive action operations.

In order to answer the primary and secondary questions, the study is structured to answer:

1. Engineer Construction Companies Organization
2. What is the role of engineer units in support of decisive action?
3. Structure, capabilities of past, present and future engineer forces in support of Brigade Combat Teams (HBCT, IBCT, and SBCT)
4. Scenarios that will assess the current force structure of engineer forces.

Additionally, the research assesses the subject of transformation of construction companies Echelon Above Brigade (EAB) in order to identify gaps and effectiveness in support of Decisive Actions. The equipment, personnel, skill sets available through the new transformation provides the necessary means for construction operations. The intent of this chapter portrays the best possible solution to employ our construction units in different types of environments.

This analysis will provide background of:

1. Brigade Engineer Battalion construction company,



2. Echelon above Brigade (EAB) separate construction companies formation of vertical and horizontal formations (Construction Effects),
3. Legacy Engineer units (Heavy Construction).

The author also utilized the Army Universal Task List (AUTL) in order to assess and evaluate the current modular structure, followed by two scenarios in support of Decisive Action related to construction operations, DOTMLP concerns—specifically focused on Organization, Training, Leadership, current doctrine focused on ADP 3-0, and a brief comparison among evaluated units.

### Analytical Framework

The Brigade Combat Team Engineer Battalion (BEB) is the next organization set to replace the actual Brigade Special Troops Battalion (BSTB). Generally, the BEB will consist of two organic engineer companies with capabilities of providing mobility, counter mobility and survivability operations, one Military Intelligence company, one Signal Company and one Headquarters company will capabilities of chemical, biological, radiological and nuclear defense (CBRN) and military police (MP). The construction company consists of three platoons (1-vertical, 1-horizontal, 1-route clearance platoon), as shown on figure 8. The total personnel strength is approximately 129 Soldiers. There will be three different variations of construction companies in order to properly provide construction. The construction company to support HBCT will consist of 129 Soldiers, the IBCT will consist of 123 Soldiers, and the BCT will consist of 123 Soldiers.

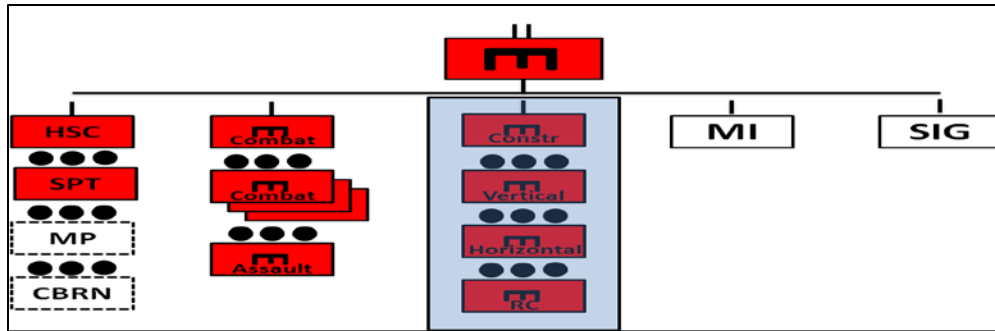


Figure 8. Brigade Combat Team Engineer Battalion  
(Replacing the current BSTB Model)

*Source:* Brigade Engineer Battalion Concept Brief, Fort Leonard Wood, MO.

The EAB Engineer Battalion provides general engineering operations in support of Maneuver Commander, Engineer Brigade or MEB. The Battalion under new transformation is called Construction Effects Battalion. The Construction Effects Battalion plans, integrates and directs execution of missions conducted by 3-5 missions tailored Engineer Companies not organic to maneuver units and augment engineer units organic to Corps and Division. It is comprised of 3-5 engineer companies with capabilities of Horizontal, Vertical, Surveying, bridging and forward support company. “The battalion plan and support for construction of obstacles, defensive positions, fixed and floating bridge construction, and river crossing operations.”<sup>1</sup>

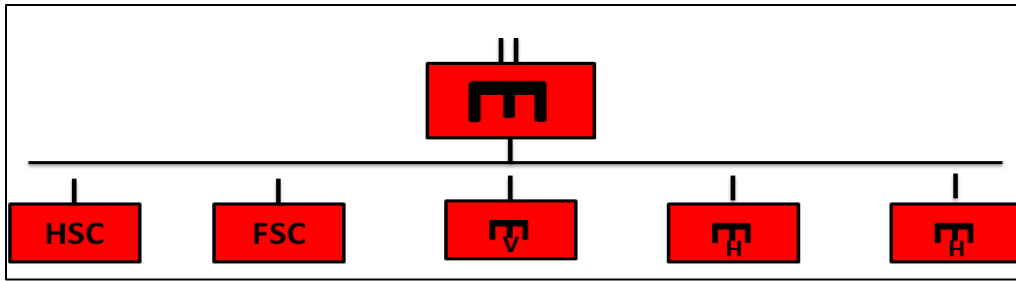


Figure 9. Construction Effects Battalion

*Source:* Created by author.

The old legacy construction battalion model formerly called Combat Heavy Construction Battalion (Force XXI) was structured with two to three multi-functional construction companies. One general engineering company was able to provide horizontal and vertical capabilities. A single company provided mobility, limited counter mobility, and survivability operations to BCTs or support elements. The construction company was comprised of 145 Soldiers, organized in three platoons (usually two vertical platoons, one horizontal platoon and a headquarters and maintenance section). The core mission is to provide general engineering operations such as base camp construction, repair/construct vertical infrastructure, repair/construct Lines of Communication (LOC) in support of Maneuver or supporting elements.

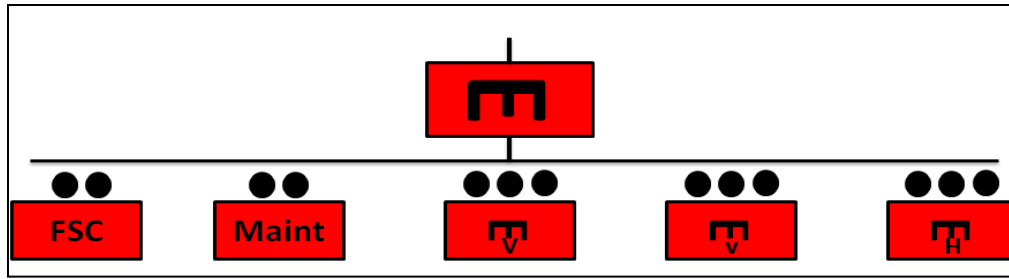


Figure 10. Legacy Construction Company (Force XXI)

*Source:* Created by author.

The author used the official Army Force Management System Web Site (FMSWEB), Force Management and Force Structure to capture the engineer structures and capabilities organic to the Echelon Above Brigade engineer units. FMS Website already provides already the approved information and documents such as table of organization and equipment (TOE), modified table of organization and equipment (MTOE). Additionally, the author utilized the Army Training Network (ATN) to identify the Army Universal Task Lists (AUTL) necessary for engineer units to train in support of Decisive Action (Offense, Defense, Stability and Defense Civil Support Authority (DCSA)). These tasks allow the author to distinguish the importance of having the right elements to accomplish their mission at hand and to better employ its forces. These tasks are necessary to conduct engineer operations with specific focus areas of mobility, counter-mobility, survivability and general engineering operations in war and peace.

Based on the analysis and unit comparison, the author is able to answer the primary and secondary research questions. Finally, the author provides two different scenarios in support of combat and nation assistance in order to develop an answer to the research questions. These observations were gathering from journals, articles, lessons

learned provided by the Engineer Center Maneuver of Excellence, and former interviews to Battalion Commanders.

Lastly, this research is to avoid violating operational security (OPSEC) and respect personal anonymity when requested. This research should represent a non-biased view of the factors affecting multi-functionally of engineer construction companies in support of decisive actions. This research should guide the reader from the problem to a possible solution that could be used in future operations as the Army may go through another transformation as it tries for fight in the Global War on Terror and other future scenarios where different elements of Decisive Action may be required.

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<sup>1</sup>Engineer Force Transformation Table of Organization 2010.

## CHAPTER 4

### ANALYSIS

Engineer units are usually asked to accomplish a wide variety of missions and expected to have a general understanding of all aspects of military construction.  
— CPT Walter K. Bogardus

The purpose of this chapter is to apply and demonstrate the descriptive study research methodology, informed by historical data as described on chapter three above, in order to determine if the new modular construction company has enough organic engineer capability to conduct construction operations in support of decisive action. This chapter will be divided in five different sections. The first section begins with an outline of the organic structure and capabilities of the construction companies inside the Brigade Engineer Battalion in support of Brigade Combat Teams (BCTs), Construction Effects Battalions and the old legacy engineer battalion concept (Force XXI). The second section of this chapter focuses on the Army Universal Task List (AUTL). This identifies what requirements are necessary for construction units in order to accomplish operations during decisive action based on information compiled by the author's research of engineer tasks primarily in Afghanistan. The third section covers two possible scenarios during decisive actions. The scenarios to cover are during combat operations (construction of company/battalion size forward operating baser) and second one in support of defense civil support authority (construction of a base camp in support of disaster relief). The fourth section addresses concerns within DOTMLPF that the new modular force may face in support of construction operations. The fifth section will

briefly compare the three different engineer models used on this thesis and to how do engineers support decisive action.

“Engineer missions take on added dimensions and significance against a Threat Model that dictates operations over an extended, dispersed, distributed, noncontiguous, nonlinear, and three-dimensional battlespace, to include forcible, early entry operations, and operational maneuver (figure 11 compares current vs. Future Force Battle Space)”<sup>1</sup>

Additionally, the Army’s vision of the operational environment realizes that the adversaries may apply hybrid (conventional or unconventional warfare), asymmetric in order to deny access to, movement of, friendly forces, to a theater of operation and in individual battlespace. “Finally, the physical environment, to include terrain, infrastructure, weather, hazards, and the presence of the local populace, will affect any ground force, sometimes even more than enemy actions. The more time available, the greater the preparation of a position, zone, or Area of Responsibility (AOR). This is a reflection of Engineer effort and time to devote to that effort.”<sup>2</sup>

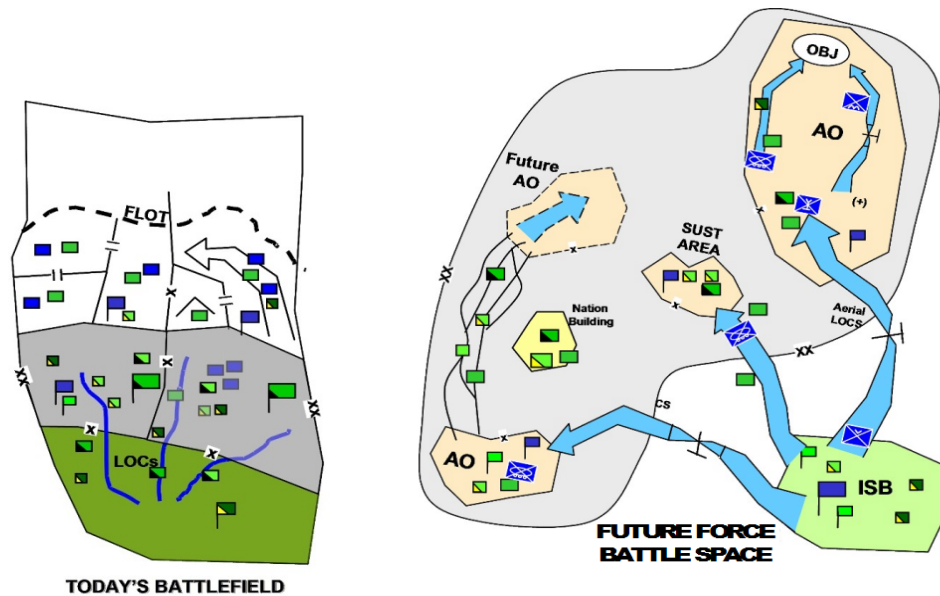


Figure 11. Current vs. Future Force Battlespace

Source: "The Future Engineer Force," *Military Technology* 31, no 7 (July 2007): 10.

## Engineer Structure

### Brigade Engineer Battalion Construction Company

The Engineer Restructure Initiative (ERI) was implemented at the division level during the first Gulf War. Under ERI, the heavy divisions established an engineer brigade headquarters that had assigned engineer battalions. These battalions formed part of a habitual relationship with the maneuver brigade in the division. The normal support to a BCT was three engineers companies. These brigades were also supported by the EAB engineer forces based on the missions they were assigned.<sup>3</sup>

The mission of the construction engineer company is "to increase construction effectiveness of the Brigade Combat Team by providing mobility, counter mobility, survivability, and general engineering tasks, or to perform combat tasks when required."<sup>4</sup>



This company becomes organic and it is being tasked organized to a point where it can provide some level of construction tasks to a BCT. The company provides three platoons—one horizontal, one vertical, and a route clearance platoon. In order to form these capabilities, these three platoons have to transfer from the EAB.

The Horizontal Platoon provides limited horizontal construction assets. It can also provide command and control of Engineer Effects platoons that are necessary to conduct missions such as repair, maintain, construct air/ground lines of communication (LOC); emplace culverts; hauling; force protection; and limited clearing operations. The vertical platoon provides command, control and construct base camps (company level), internment facilities; construct, repair, maintain vertical infrastructures within BCTs. The route clearance platoon mission is to conduct detection and neutralization of explosive hazards along routes in support of maneuver or support brigades to enable force application, focused logistics, and protection. However, the Construction Company may be diverse in capability since the organization may require other elements of support structure.

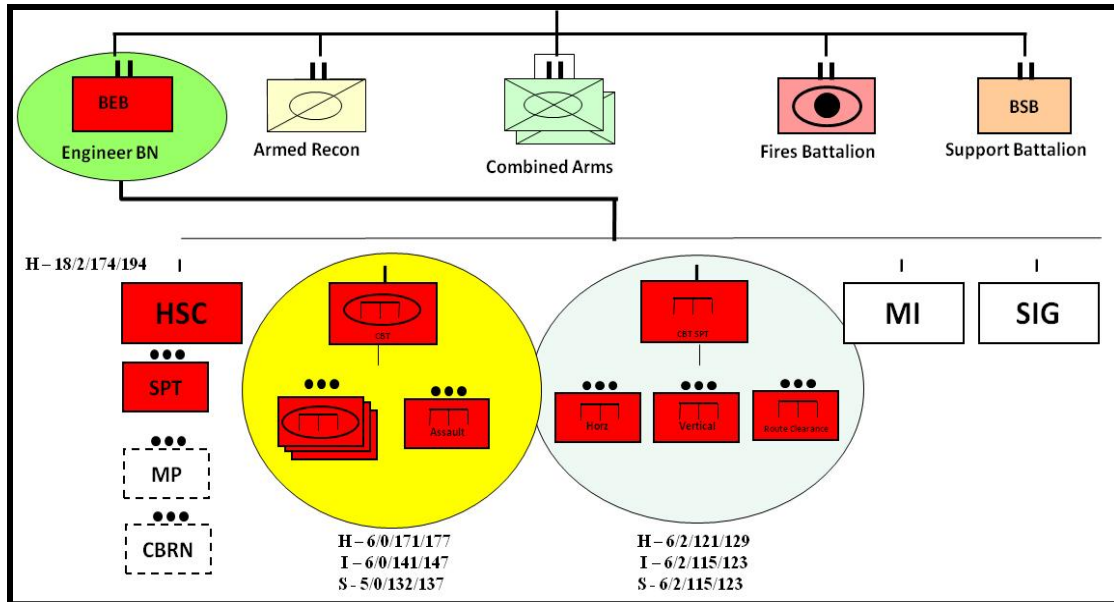


Figure 12. Brigade Combat Team (BCT) Engineer Battalion Task Organization

*Source:* Brigade Engineer Battalion Concept Brief, Fort Leonard Wood, MO.

Under modularity the engineer battalion structure inside the BCT was also eliminated and the two engineer companies were formed—these were initially Echo companies in the combined arms battalions (CAB). With the second generation of the modular BCT, these two companies were merged into one company and assigned to the BSTB.

The BEB concept responds to concerns brought up by senior Army leadership in order to close the gap at the BCT level since the current structure does not have a robust engineer capability within the brigade. “Experience has shown that the current modular design—referring to the BSTB, is not the best solution for engineers, both C2 and for capability. With the complexity and pace of operations, BCT commanders requires an engineer battalion commander and his staff to provide engineer advice and to more

effectively employ the engineer forces in the BCT area of operations.”<sup>5</sup> It is important to understand that the new BEB may provide the right framework (C2 and engineer capabilities) to the existing HBCT and IBCT if all the elements of construction are in consideration and therefore implemented.

According to the future of the Brigade Engineer Battalion, the following remarks were obtained from the BEB concept.<sup>6</sup>

1. Even with the BEB in place, additional engineer assets will be necessary based on our doctrinal rules of allocation. Experience has shown that engineer units are being task organized to BCTs in theater. But they are not synchronized with the ARFORGEN cycle.
2. In order to form the BEB, the company has to migrate these capabilities from the EAB. Some might wonder about the RCP platoon being assigned to the construction company. The primary reason is the dependency on the horizontal assets to conduct route remediation and repair.
3. The vertical construction assets being assigned to a BCT have been somewhat controversial. The battle lab modeling along with combat experience has verified this need and the chart lists some of the key vertical tasks in the far right column.
4. According to the BEB concept brief—having less engineers in the EAB, particularity in the active component, makes short notice requirements and surge requirements more difficult to source
5. There is an imbalance of engineer force structure between the active and reserve components. The BEB does not resolve that problem. What the BEB does is to migrate some engineer assets from the echelon above brigade to the BCT.

Table 1. BEB Construction Company Capability

<u>Element</u>		<u>Work Effort Available</u>	<u>Examples of work completed (per day)</u>
<b>Blade Teams</b>	<b>6 D7 (3 TMs) 2 ACE (1 TM)</b>	<b>60 Blade Team hours / Day</b>	<b>60 hull down psns, 3000m AT ditch Route Sanitation, LZs for UAS Enable BCT Logistics Support</b>
<b>SEE/Backhoe</b>	<b>6 HMEE (+3)</b>	<b>90 Equipment hours / Day</b>	<b>180 crew served fighting psns HESCO Bastions; route sanitation</b>
<b>Horizontal Construction</b>	<b>15 pieces of construction equipment</b>	<b>240 Equipment hours / Day</b>	<b>1-4 miles of road repair Clear &amp; grub 4 acres Enhance Force Protection</b>
<b>Vertical Construction</b>	<b>3 Plumbers 6 Electricians 10 Carpenter/ Masons</b>	<b>190 Man hours / day</b>	<b>Combat Outposts Squad Living Areas Restore Essential Services</b>
<b>Route Clearance</b>	<b>2 Buffalo 4 Husky</b>	<b>42.5 km / day (two lane)</b>	<b>42.5 km of route cleared</b>

Source: Brigade Engineer Battalion Concept Brief, Fort Leonard Wood, MO.

#### Separate Engineer and Vertical Companies (Modularity)

The engineer modularity consist of an engineer company can command and control, plan, integrate, and direct the execution of two to four engineer platoons (vertical, horizontal and possibly combat engineers), depending on the mission and engineer requirements. The majority of the engineer construction companies are now broken down into vertical and horizontal formations with limited general engineering capability forcing request external support from other elements possibly available in the parent engineer battalion. This arrangement offers many disadvantages over a multi function company because these assets are already available under the old model as it can support various levels of engineering missions. However, in order to exploit on these advantages, the engineer company must reorganize and train correctly so it is proficient to conduct operations across all engineer functions.

Typically, a construction effects battalion is comprised of one or two vertical companies, one or two horizontal companies, engineer Support Company. It can also be augmented with additional assets such as Sapper Company, Clearance Company, mobility Augmentation Company.<sup>7</sup> The construction type unit is one of the most required needs for by BCTs in order to accomplish high tactical and operational level force application, forced protection and focused logistics—in support of operations and campaigns. Each baseline construction unit has a discrete capability that must be combined in time and space to accomplish a construction mission. An example of combined mission and effort is provided in chapter 2; the 864th Construction Effects Battalion is tasked organized as a modular force. During their deployment to Afghanistan the unit was forced to combine their engineer capabilities into teams as shown on figure 13. “For some missions, they have high, but infrequent dependency on special engineer units elsewhere in the force pool.”<sup>8</sup> This engineer capabilities are built to provide additional augmentation to any type of BCT (Heavy, Infantry, Stryker) from what has already been added by the BEB or any type of Support Brigade (Fires, RSTA, Aviation, Sustainment, or Maneuver Enhancement).

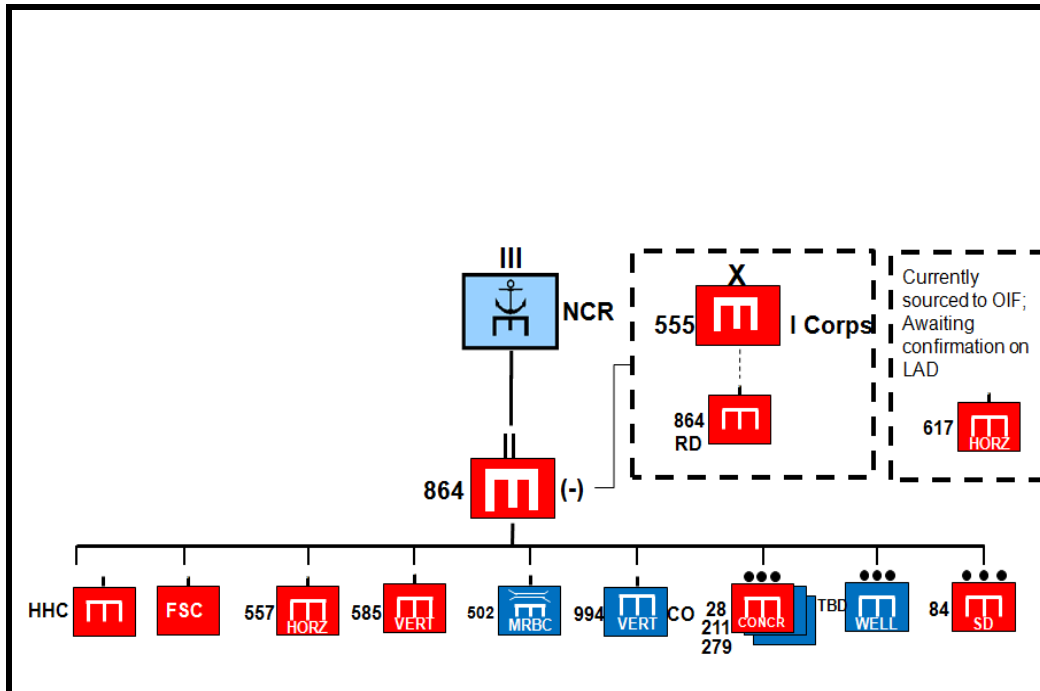


Figure 13. 864th Engineer Battalion: Modularity

Source: 864th Engineer AAR–Engineer School Center of Excellence.

To understand modularity it is important to highlight what each element of construction can provide to maneuver or support elements. The mission of the vertical company is to “command, control and construct base camps, internment facilities; construct, repair, maintain vertical infrastructures in support of Support Brigade or Engineer Brigades.”<sup>9</sup> This company is capable of providing three vertical platoons to Maneuver BCT or Support Brigade during decisive action. This company is capable of construct, repair, maintain wood frame, steel frame, concrete and pre-engineered structures; construct, maintain and repair interior plumbing, water distribution, sewage distribution systems; construct culverts, abatements and retaining walls; emplace interior electrical or sewer systems.

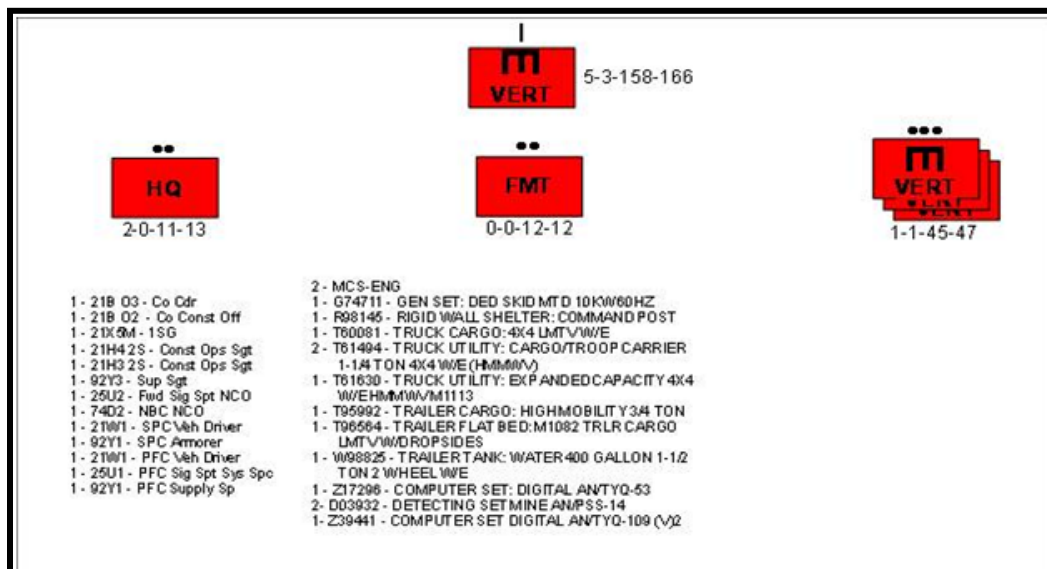


Figure 14. Vertical Company (Modularity)

Source: U.S. Army Force Management Support Agency, FMSWeb, <https://fmsweb.army.mil/>.

The horizontal company mission is to “provide command and control of engineer effects platoons that are necessary to conduct missions such as repairs, maintain, construct air/ground LOCs; emplace culverts, hauling; force protection, and limited clearing operations.”<sup>10</sup> This company can provide personnel and equipment to perform Engineering tasks such as clearing and grubbing operations; haul, grade, shape, compact, cut and fill materials; emplace culverts; remove snow/ice; construct drainage structures; conduct burrow pit operations; provide dust control operations; construct base camps, air landing platforms, FARPS, supply routes, roads, control points, fire bases, tank ditches, ASPs, and field hospital platforms; prepare river site crossing sites; and support port repair due to HYEX. Additionally, provides lift and load support in order to remove stockpiles; haul material; remove rubble; or raze and remove structures. Has the

capability to conduct convoy operations and borrow pit operations, as well as providing force protection to maneuver or support forces.

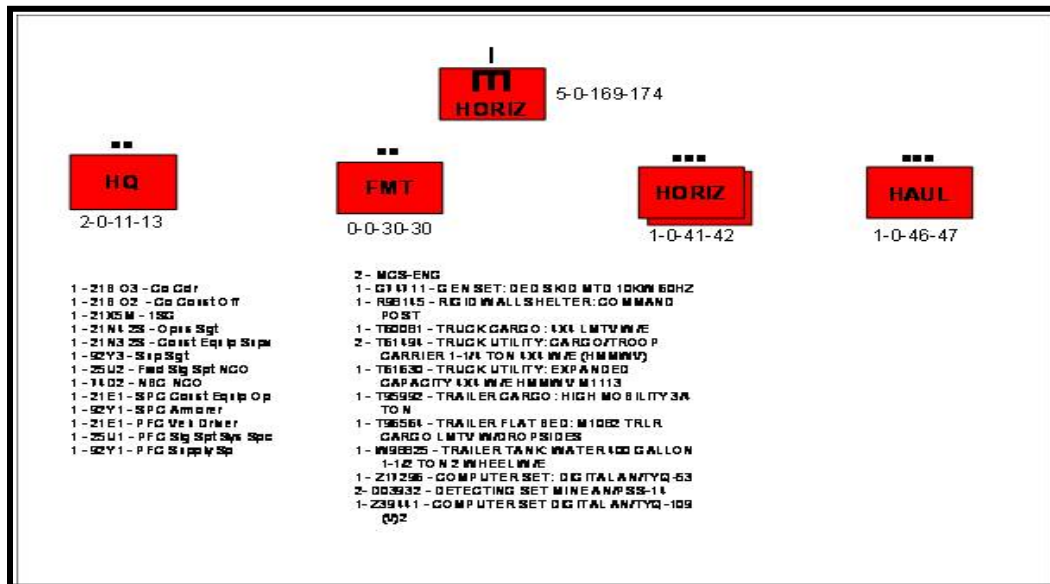


Figure 15. Horizontal Company (Modularity)

Source: U.S. Army Force Management Support Agency, FMSWeb, <https://fmsweb.army.mil/>.

As part of the transformation, the Corps of Engineers re-design of Future Engineer Forces (FEF) provides adaptable and scalable engineer capabilities required to meet the challenge of Decisive Action. However, shifting assets from one area to another becomes a challenge when the area of operation is non-contiguous and the movement of capability becomes increasingly reliant on intra-theater airlift—already at a premium—or transiting the “gray space” by ground.



### Legacy Engineer Company (Force XXI)

Under Force XXI, the engineer company mission was to increase the combat effectiveness of Divisions, Corps, and the Army Service Component Command (ASCC) by accomplishing general engineering tasks and limited mobility, counter-mobility, and survivability tasks. This unit will also perform rear area security operations, to include Infantry combat missions as required.<sup>11</sup> This organization was able to accomplish the following tasks:

1. Capable of provide two or three vertical platoons to Maneuver BCT or Support Brigade
2. Command, control and construct base camps, internment facilities (construction, repair, maintain vertical infrastructures)
3. Capable of provide one horizontal platoon s in order to conduct missions such as repair, maintain, construct air/ground LOC; emplace culvert, hauling, force protection, and limited clearing operations.

Historically, the Legacy Engineer Company (Force XXI) mission was to provide construct base camps, internment facilities; construct, repair, maintain vertical infrastructures in support of Support Brigade of Engineer Brigades. Additionally, since this type of organization was able of conducting horizontal construction, the company had the capability to provide personnel and equipment to perform engineering tasks such as clearing and grubbing operations; haul, grade, shape, compact, cut and fill materials; emplace culverts; remove snow/ice; construct drainage structures; conduct borrow pit operations; provide dust control operations; construct base camps; air landing platforms, FARPS, supply routes, roads, control points, fire bases, tank ditches, ASPs, and field

hospital platforms; prepare river crossing sites; and support port repair due to HYEX, provides force protection.

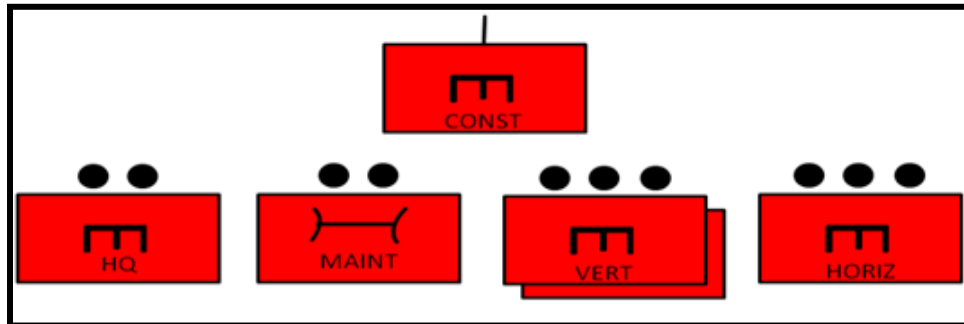


Figure 16. Legacy Construction Company (Force XXI)

*Source:* Created by author.

The Legacy engineer company had way more engineer assets when compared with the new EAB modular structure and the Brigade Combat Team Engineer Battalion organization. The engineer company consisted of approximately 145 Soldiers which were broken down in two to three vertical platoons and one horizontal platoon. Each vertical platoon has from 34-39 Soldiers (interior electrician, plumbers, Carpentry / Masonry).

To respect to the horizontal platoon had approximately 35 Soldiers. The horizontal platoon was capable of conducting clearing and grubbing operations; haul, grade, shape, compact, cut and fill materials, emplace culverts; remove snow/ice; construct drainage structures; conduct burrow pit operations, provide dust control operations; construct base camps, prepare river crossing sites, and limited route remediation. The primary pieces of equipment organic to the company: two graders, five

dozers, four scrapers, one front loader/excavator, one water tank, one compactor, two vibrator rollers, two dump trucks.

### Engineer Companies AUTL

The AUTL are identified as the primary tasks that units must train and conduct in support of decisive actions. These tasks are performed at the company level for all different structures identified below. This are approved list of general and core capabilities that each organization was designed to perform based on their mission, MTOE and doctrine. The AUTL is standard across all of these organizations, this are where units identified their MTEL based on mission requirements. The standardization is what drives training for this kind of construction units in preparation for Unified Land Operations.

The AUTL shown below in tables 2 and 3, defines the general tasks and the main capability tasks of EAB Engineer construction companies under modularity. All the engineer construction companies have the same general task of conducting command and control, protecting the force, and providing sustainment (lines of engineer operations). In decisive action, units may conduct these tasks to different extent concurrently through a battle space owner.

The core mission of the Horizontal Construction Company is to provide command and control of engineer effects platoons that are necessary to conduct missions such as repair, maintain, construct lines of communication; emplace culverts; hauling; force protection; and limited clearing operations.

Table 2. Horizontal Construction (Modularity)

Horizontal Construction Company	
Conduct Company Operations (05-TS-2401) Company	Conduct Horizontal Construction Operations (05-TS-3417)
Manage General Construction Operations (05-TS-2405) Company	Support Horizontal Construction operations, Platoon level (05-TS-3420)
Construct, Repair and Maintain Lines of Communication (LOC) (05-TS-2407) Company	Conduct Platoon Operations, Horizontal Platoon (05-TS-3421)
Conduct Small Unit Infantry Tactics (05-TS-2408) Company	Conduct Quarry Operations, Quarry Platoon (05-TS-3423)
Conduct Tactical Convoy Operations (05-TS-2410) Company	Provide Dump Truck Haul Support, Equipment Support Platoon (05-TS-3434)
Protect and Defend (05-TS-2413) Company	Conduct Earth Moving Section Operations, EM Wheel Section (05-TS-4446)
Plan and control Sustainment (05-TS-2416) Company	Conduct Demolition Operations, Engineer Squad (05-TS-4453)
Conduct Deployment Operations (05-TS-2424) Company	Conduct Earth Moving Section Operations, EM Track Section (05-TS-4465)
Operate Digital Equipment (05-TS-2428) Company	Conduct Earth Moving Section Operations, EM Compaction Section (05-TS-4466)
Operate Digital Equipment Systems, Platoon level (05-TS-3408)	Conduct Section Operations, Equipment Support Section (05-TS-4467)
Conduct Tactical Convoy Operations, Platoon level (05-TS-3411)	Provide Asphalt for Construction Operations, Asphalt Team (05-TS-4469)
Conduct / Support Reconnaissance Operations, Platoon Level (05-TS-3412)	Protect the Force, Engineer Platoon (05-TS-3416)

Source: Created by author.

The vertical Construction company core mission is to control and construct base camps, internment facilities; construct, repair, maintain vertical infrastructures in support of Support Brigades or Engineer Brigades.

Table 3. Vertical Construction Company (Modularity) Data

Vertical Construction Company:	
Conduct Company Operations (05-TS-2401) Company	Conduct Combat Construction, Vertical Platoons (05-TS-3407)
Manage General Construction Operations (05-TS-2405) Company	Operate Digital Equipment Systems, Platoon level (05-TS-3408)
Construct, Repair and Maintain Lines of Communication (LOC) (05-TS-2407) Company	Conduct Tactical Convoy Operations, Platoon level (05-TS-3411)
Conduct Small Unit Infantry Tactics (05-TS-2408) Company	Conduct / Support Reconnaissance Operations, Platoon Level (05-TS-3412)
Conduct Tactical Convoy Operations (05-TS-2410) Company	Protect the Force, Engineer Platoon (05-TS-3416)
Protect and Defend (05-TS-2413) Company	Conduct General Construction Operations, Vertical Squad (05-TS-4451)
Plan and control Sustainment (05-TS-2416) Company	Conduct Demolition Operations, Engineer Squad (05-TS-4453)
Conduct Deployment Operations (05-TS-2424) Company	Construct / Repair Tactical and Fixed Bridge Structure, Vertical Squads (05-TS-4455)
Operate Digital Equipment (05-TS-2428) Company	Conduct Combat Construction, Vertical Squads (05-TS-4457)
Conduct Platoon Operations, Vertical Platoon (05-TS-3401)	Construct / Repair Airfield Surfaces, Vertical Squad (05-TS-4461)
Conduct General Construction Operations, Vertical Platoon (05-TS-3403)	Provide Concrete for Construction Operations, Concrete Team (05-TS-4470)

Source: Created by author.

The Legacy construction units (Force XXI), as shown in tables 4 and 5, are almost identical to the modularity for vertical and horizontal construction company except that legacy units were structured to operate as a multi-functional force, meaning that vertical and horizontal were part of one core unit.

Table 4. Legacy Construction Company (Force XXI)

Horizontal Platoon	Vertical Platoon
Operate Digital Equipment Systems, Platoon level (05-TS-3408)	Conduct Platoon Operations, Vertical Platoon (05-TS-3401)
Conduct Tactical Convoy Operations, Platoon level (05-TS-3411)	Conduct General Construction Operations, Vertical Platoon (05-TS-3403)
Conduct / Support Reconnaissance Operations, Platoon Level (05-TS-3412)	Conduct Combat Construction, Vertical Platoons (05-TS-3407)
Protect the Force, Engineer Platoon (05-TS-3416)	Operate Digital Equipment Systems, Platoon level (05-TS-3408)
Conduct Horizontal Construction Operations (05-TS-3417)	Conduct Tactical Convoy Operations, Platoon level (05-TS-3411)
Support Horizontal Construction operations, Platoon level (05-TS-3420)	Conduct / Support Reconnaissance Operations, Platoon Level (05-TS-3412)
Conduct Platoon Operations, Horizontal Platoon (05-TS-3421)	Protect the Force, Engineer Platoon (05-TS-3416)
Conduct Quarry Operations, Quarry Platoon (05-TS-3423)	Conduct General Construction Operations, Vertical Squad (05-TS-4451)
Provide Dump Truck Haul Support, Equipment Support Platoon (05-TS-3434)	Conduct Demolition Operations, Engineer Squad (05-TS-4453)
Conduct Earth Moving Section Operations, EM Wheel Section (05-TS-4446)	Construct / Repair Tactical and Fixed Bridge Structure, Vertical Squads (05-TS-4455)
Conduct Demolition Operations, Engineer Squad (05-TS-4453)	Conduct Combat Construction, Vertical Squads (05-TS-4457)
Conduct Earth Moving Section Operations, EM Track Section (05-TS-4465)	Construct / Repair Airfield Surfaces, Vertical Squad (05-TS-4461)
Conduct Earth Moving Section Operations, EM Compaction Section (05-TS-4466)	Provide Concrete for Construction Operations, Concrete Team (05-TS-4470)
Conduct Section Operations, Equipment Support Section (05-TS-4467)	
Provide Asphalt for Construction Operations, Asphalt Team (05-TS-4469)	

Source: Created by author.

Table 5. HQ Section for Legacy Construction Company (Force XXI)

<u>HQ Platoon</u>
Conduct Company Operations (05-TS-2401) Company
Manage General Construction Operations (05-TS-2405) Company
Construct, Repair and Maintain Lines of Communication (LOC) (05-TS-2407) Company
Conduct Small Unit Infantry Tactics (05-TS-2408) Company
Conduct Tactical Convoy Operations (05-TS-2410) Company
Protect and Defend (05-TS-2413) Company
Plan and control Sustainment (05-TS-2416) Company
Conduct Deployment Operations (05-TS-2424) Company
Operate Digital Equipment (05-TS-2428) Company

Source: Created by author.

The BEB construction company as shown in tables 6 and 7 is almost identical to the Legacy construction units (Force XXI). However, the BEB adds additional capabilities of a route clearance package something that Modularity or legacy did not have.

Table 6. BEB Construction Company

<u>Horizontal Construction Platoon</u>	<u>Vertical Construction Platoon</u>
Operate Digital Equipment Systems, Platoon level (05-TS-3408)	Conduct Platoon Operations, Vertical Platoon (05-TS-3401)
Conduct Tactical Convoy Operations, Platoon level (05-TS-3411)	Conduct General Construction Operations, Vertical Platoon (05-TS-3403)
Conduct / Support Reconnaissance Operations, Platoon Level (05-TS-3412)	Conduct Combat Construction, Vertical Platoons (05-TS-3407)
Protect the Force, Engineer Platoon (05-TS-3416)	Operate Digital Equipment Systems, Platoon level (05-TS-3408)
Conduct Horizontal Construction Operations (05-TS-3417)	Conduct Tactical Convoy Operations, Platoon level (05-TS-3411)
Support Horizontal Construction operations, Platoon level (05-TS-3420)	Conduct / Support Reconnaissance Operations, Platoon Level (05-TS-3412)
Conduct Platoon Operations, Horizontal Platoon (05-TS-3421)	Protect the Force, Engineer Platoon (05-TS-3416)
Conduct Quarry Operations, Quarry Platoon (05-TS-3423)	Conduct General Construction Operations, Vertical Squad (05-TS-4451)
Provide Dump Truck Haul Support, Equipment Support Platoon (05-TS-3434)	Conduct Demolition Operations, Engineer Squad (05-TS-4453)
Conduct Earth Moving Section Operations, EM Wheel Section (05-TS-4446)	Construct / Repair Tactical and Fixed Bridge Structure, Vertical Squads (05-TS-4455)
Conduct Demolition Operations, Engineer Squad (05-TS-4453)	Conduct Combat Construction, Vertical Squads (05-TS-4457)
Conduct Earth Moving Section Operations, EM Track Section (05-TS-4465)	Construct / Repair Airfield Surfaces, Vertical Squad (05-TS-4461)
Conduct Earth Moving Section Operations, EM Compaction Section (05-TS-4466)	Provide Concrete for Construction Operations, Concrete Team (05-TS-4470)
Conduct Section Operations, Equipment Support Section (05-TS-4467)	
Provide Asphalt for Construction Operations, Asphalt Team (05-TS-4469)	

Source: Created by author.

Table 7. BEB Construction Company (Route Clearance and HQ Section)

Route Clearance Platoon:	HQ Section
Conduct Route Clearance Operations, Clearance Platoon (05-TS-3300)	Conduct Company Operations (05-TS-2401) Company
Conduct / Support Reconnaissance Operations, Clearance Platoon (05-TS-3313)	Manage General Construction Operations (05-TS-2405) Company
Enhance Force Protection, Clearance Platoon (05-TS-3336)	Construct, Repair and Maintain Lines of Communication (LOC) (05-TS-2407) Company
Conduct Route Clearance Squad Operations (05-TS- 4372)	Conduct Small Unit Infantry Tactics (05-TS-2408) Company
Squad Demolitions, Clearance Squad (05-TS-4376)	Conduct Tactical Convoy Operations (05-TS-2410) Company
Protect and Defend the Company and Critical Assets, Clearance Company (05-TS-2344)	Protect and Defend (05-TS-2413) Company
Provide Horizontal Equipment Support to Clearance Operations (05-TS-3417)	Plan and control Sustainment (05-TS-2416) Company
Multi-Echelon Training Events	Conduct Deployment Operations (05-TS-2424) Company
	Operate Digital Equipment (05-TS-2428) Company

Source: Created by author.

The mission of the BEB construction company is to provide the BCTs with full spectrum stance construction capabilities and route clearance with a baseline of organic engineer capability.

The priority task for construction engineers supported the lines of Engineer Support. This line of efforts continues to be a priority during decisive action.

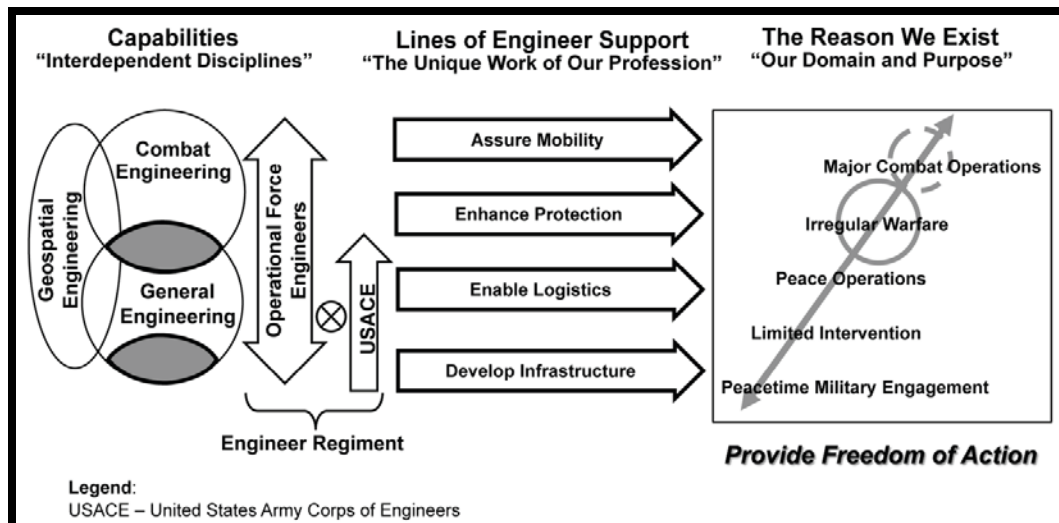


Figure 17. Engineer Framework

Source: Department of the Army, Field Manual (FM) 3-34, *Engineer Operations* (Washington, DC: Government Printing Office, 2011).

As the author illustrates how engineers support Decisive Action, it is important to define how each of the elements provides lines of Engineer Support. Assured Mobility, Enhance protection, enable logistic and develop Infrastructure are the primary tasks for all construction engineer units whether employed in combat or in support of defense support civil authority and stabilization. During Operation Enduring Freedom most construction companies continues to provide the following tasks: (1) Improved Infrastructure, (2) construct and repair bridges, (3) maintain and improve LOCs or MSRs/ASRs, (4) Conducted Quality Assurance/Quality Control, (5) Construction Oversight, and (6) Constructed and Improved Bed down facilities.

These engineer forces provided lines of engineer support to the Maneuver or Engineer Brigades. The next priority task supported by construction forces was force protection and survivability operations. They emplace barriers, force protection walls and



Entry control points with the equipment already available within the unit. Then tasked focused on general engineering support.

During Stability operations, construction engineers constructed and maintained base camps, facilities, and infrastructure, conducted winterization of existing facilities, conducted assessment of essential services for either coalition of Afghan Forces, electrical repair and power generation, and contract management/contracting liaison duties.

#### ADP 3-0 Relation to the Engineer Doctrine and Problem

Engineer planner should consider a number of general considerations, including speed, economy, flexibility, decentralization of authority, and establishment of priorities.”<sup>12</sup>

Part of understanding how construction engineers are employed, it is important to use the AUTL as a baseline or analytical framework by showing what tasks are important to use while supporting combat elements as they are provided previous tables. It will be used to analyze these engineer construction tasks as well as the importance of how each element supports Decisive action.

FM 3-34 does not separate capabilities within construction organizations, however, the analysis initially recommends that construction companies should remain multi-functional for better support to BCTs or Supporting Brigades and Battalions.

Training: collective training is more difficult as separate for several reasons. First, the engineer companies are not multifunctional prior deployment as it is sets to supports decisive action. Most either have all modular construction effects / combat heavy units, such as vertical and horizontal construction companies or transitions once

overseas. This cause some challenges in both types of construction companies whether they are in support of DCSA (Defense Civil Support Authority) or Offensive / Defensive Operations since no parallel training was conducted prior, although those with construction platoons in garrison can quickly transition or augment a unit into a multi-functional company. The engineer company without modularity units in garrison normally is not organized or trained to manage construction and has a much steeper learning curve when transitioning to a multi-functioning unit (for example –old legacy companies model). An easy fix to resolve this issue would be to organize the company in garrison as a multi-functional construction units. When possible, engineer battalion should reorganize their companies from both modular combat and construction companies to the proven legacy model.

In order to enable a company headquarters to train across all engineer functions, they could each give one to two organic platoons to each company. If that is not feasible, they could attach platoons to the other companies for specific training events or construction projects.

Another issue affecting collective training is the ability to plan, develop, resource, and execute construction projects in garrison similar to ones that will be expected in a theater of operations or humanitarian missions. Any engineer company needs to be able to integrate construction planning and processes into its training plans even though at times is challenging because construction projects in garrison are difficult to resource or synchronize.

According to FM 3-34, “Engineers must plan for the acquisition of uncontaminated land and facilities, and their management and ultimate disposal to support operations, including:

1. Operational facilities (such as CPs, airfields, ports).
2. Logistics facilities (such as maintenance facilities, supply points, warehouses, ammunition supply points, waste management areas/facilities, and APOD or SPOD for sustainment).
3. Force bed-down facilities (such as dining halls, billeting, religious support facilities, clinics, and hygiene facilities).
4. Common-use facilities (such as roads and facilities for joint reception, staging, onward movement, and integration).
5. Protection facilities (such as site selection, proximity to potential threat areas, and sniper screening).
6. Completion of an environmental baseline survey and occupational environmental health site assessment before site selection or use of facilities to ensure minimal exposure to contaminants

Additionally, FM 3-34 states that “preparation consists of activities performed by the unit before execution to improve its ability to conduct the operation. As required, engineer forces will conduct additional construction or other technical preparation activities focused on the specific mission. Construction and technical preparation activities include:

1. Completing and reviewing the design. In a design-build process the design will typically only be

2. Completed at a ten- to thirty-percent resolution before execution.
3. Conducting any necessary preconstruction studies or surveys.
4. Identifying additional technical support required.
5. Completing any detailed planning activities not yet completed from the project management process; for example, estimates, bill of materials, and schedules.
6. Preparing the construction site as required; for example, staging equipment, stockpiling materials, and completing temporary construction.

As with preparation, engineer forces will conduct additional construction or other technically related activities during execution of the specific mission. Construction and technically related execution activities include:

1. Implementing and maintaining a construction safety program.
2. Implementing and enforcing quality controls.
3. Periodically reviewing design and construction.
4. Preparing as-built drawings.
5. Responding to construction contingencies.

The following figures describe the capabilities within each construction unit (past, present and future force) and the considerations of elements of combat power.

#### ADP 3-0 in Relation to the Problem

Future Operational Environment: much of the recent focus has been on unconventional, asymmetric threats against the USA. Secretary Gates also acknowledged this view in a speech at Kansas State University in 2007: “the real challenges we have seen emerge since the end of the Cold War—from Somalia to the Balkans, Iraq, Afghanistan, and elsewhere—make clear we in defense need to change our priorities to be

better able to deal with the prevalence of what is called ‘asymmetric warfare’ . . . it is hard to conceive of any country challenging the USA directly through conventional military terms—at least for some years to come. Indeed, history shows us that smaller, irregular forces—insurgents, guerrillas, terrorists—have for centuries found ways to harass and frustrate larger, regular armies and sow chaos. We can expect that asymmetric warfare will be mainstay of the contemporary battlefield for some time.”<sup>13</sup>

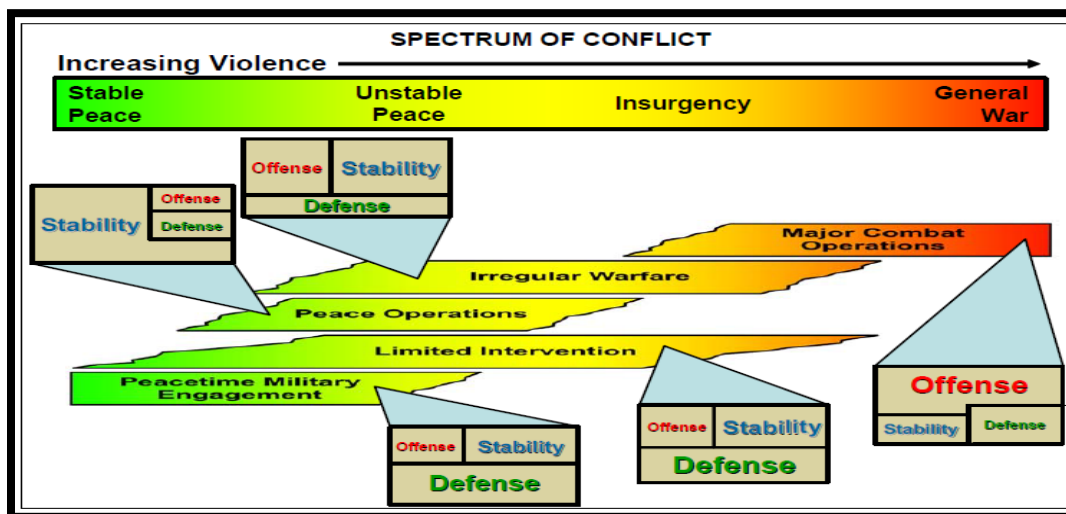


Figure 18. Full Spectrum of Conflict

Source: Department of the Army, ADP 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, 2011).

Unified Land Operations describes how the “Army seizes, retains, and exploits initiative to gain and maintain a position of relative advantage in sustained land operations through simultaneous offensive, defensive, and stability operations in order to prevent or deter conflict, prevail in war, and create the condition for favorable conflict resolution.”<sup>14</sup>

It is important to understand how engineer construction forces and its relation to doctrine. In accordance to the new changes of ADP 3-0, decisive action now replaces full spectrum operations. Unified action central idea is synchronization, coordination, and/or integration of the activities of governmental and non-governmental entities within operations to achieve unity of effort. These actions are executed through Decisive Action or previously called full spectrum operations. “A decisive action is executed through Offensive, Defensive, Stability and Defense Civil Support Authority or DCSA.”<sup>15</sup>

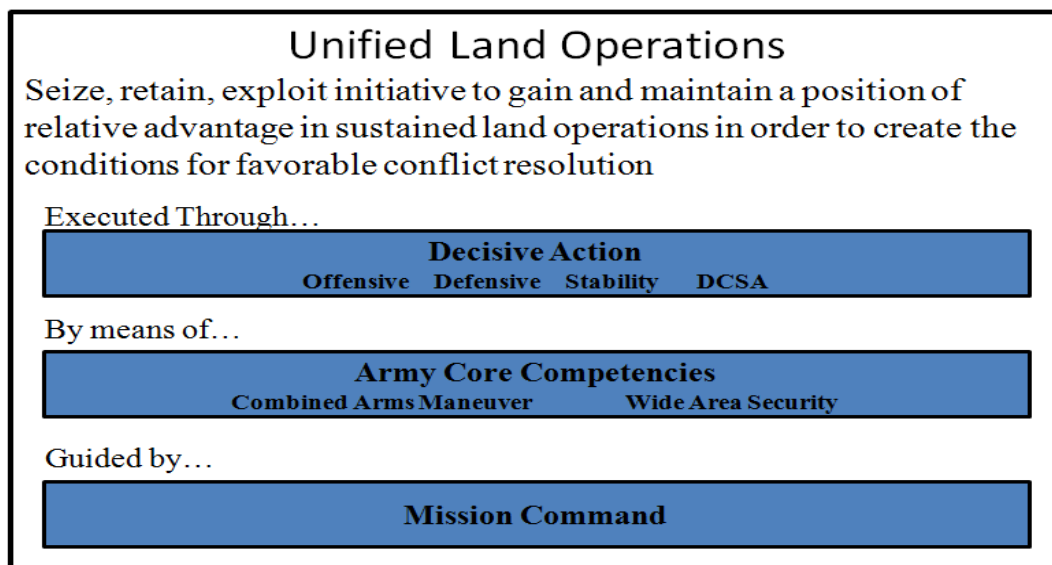


Figure 19. Unified Land Operations

Source: Department of the Army, ADP 3-0, *Unified Land Operations* (Washington, DC: Government Printing Office, 2011).

The U.S. military conducts decisive action is through offense, defense, stability and defense civil support authority. The following charts explain how engineer companies (legacy, modularity and BEB) supports decisive action.

Part of analyzing past, present and future engineer construction company, the author describes how construction operations ties in to Decisive action and what important role are played during offensive, defensive, stability and DCSA operations. How does engineer supports decisive action?

Offensive Operation is defined as “combat operations conducted to defeat and destroy enemy forces and seize terrain, resources, and population centers.”<sup>16</sup> “The engineer supports to the offense includes simultaneous application of combat, general, and geospatial, engineering capabilities through synchronizing war fighting functions and throughout the depth of the AO. Specialized engineer assets may also be necessary to accomplish certain offensive operations missions. At the operational level, general engineer activities may not be conducted as part of a combined arms mission but must, nonetheless, be fully coordinated with the maneuver commander responsible for the AO. Such general engineer support is primarily applied to enable the sustainment war fighting function, but may also be critical to the preparation for an offensive operation to include support to operational mobility.”<sup>17</sup>

During offensive operations the BEB Construction Company and the legacy (old model) Construction Company offers similar construction capabilities. However, BEB Construction Company adds an additional platoon for route clearance operations in order to support a Brigade Combat Team. High demand capabilities to support BCT operations includes: sappers, route clearance, horizontal, vertical, assault bridging and breaching success depends on organic integration during ARFORGEN process.

The following chart provides an example of how the three different model of construction companies support offensive operation. Modularity based on the diagram

provides fewer capabilities to Offensive Operation in support of mobility, survivability and counter-mobility operations.

Offense (BEB Const Co)	Def	Port Construction	Produce Concrete	Construct CBT Roads	Infrastructure Repair / Restoration	Detect / Neutralize Explosive Hazards
Stability	DCSA	Horizontal Construction	Conduct Reconnaissance	Attack Enemy FOM		
Offense (Vert Const Co)	Def	Port Construction	Produce Concrete	Construct CBT Roads	Infrastructure Repair / Restoration	Detect / Neutralize Explosive Hazards
Stability	DCSA	Horizontal Construction	Conduct Reconnaissance	Attack Enemy FOM		
Offense (Hor Const Co)	Def	Port Construction	Produce Concrete	Construct CBT Roads	Infrastructure Repair / Restoration	Detect / Neutralize Explosive Hazards
Stability	DCSA	Horizontal Construction	Conduct Reconnaissance	Attack Enemy FOM		
Offense (Legacy Cost Co)	Def	Port Construction	Produce Concrete	Construct CBT Roads	Infrastructure Repair / Restoration	Detect / Neutralize Explosive Hazards
Stability	DCSA	Horizontal Construction	Conduct Reconnaissance	Attack Enemy FOM		

Figure 20. Legacy, BEB Const Company, Construction Company (EAB Modularity) in support of Offensive Operations

*Source:* Created by author.

Defense Operations: these are combat operations conducted to defeat an enemy attack, gain time, economize forces, and develop conditions favorable for offensive or stability operations.<sup>18</sup> Engineer responsibilities during defensive operations continue to increase; more construction forces are committed to defensive operations in order to protect the force. At the operational level, “general engineer support will be continuously



conducted to harden and prepare protective positions for facilities and installations.”<sup>19</sup>

The following chart provides an example of how the three different model of construction companies support offensive operation. It shows what gaps are still open within modularity; however, BEB Construction Company closes that gap. EAB Engineer Battalion should look at re-structuring their forces so that the right framework is provided during decisive action. Based on the diagram modularity does not offer flexibility as part of decisive action. In order to close that gap, other elements from other units must be integrated.

Defense (BEB Const Co)	Offense	Horizontal Construction	Construct CBT Roads	Conduct Reconnaissance	Detect / Neutralize Explosive Hazards
Stability	DCSA	Harden Facilities	Support CM/S	Construct Positions	Attack Enemy FOM
Defense (Vert Const Co)	Offense	Horizontal Construction	Construct CBT Roads	Conduct Reconnaissance	Detect / Neutralize Explosive Hazards
Stability	DCSA	Harden Facilities	Support CM/S	Construct Positions	Attack Enemy FOM
Defense (Hor Const Co)	Offense	Horizontal Construction	Construct CBT Roads	Conduct Reconnaissance	Detect / Neutralize Explosive Hazards
Stability	DCSA	Harden Facilities	Support CM/S	Construct Positions	Attack Enemy FOM
Defense (Legacy Const Co)	Offense	Horizontal Construction	Construct CBT Roads	Conduct Reconnaissance	Detect / Neutralize Explosive Hazards
Stability	DCSA	Harden Facilities	Support CM/S	Construct Positions	Attack Enemy FOM

Figure 21. Legacy, BEB Const Company, Construction Company (EAB Modularity) in support of Defensive Operations

Source: Created by author.

Stability Operations is an overarching term encompassing various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief (JP 3-0). Forces can conduct stability operations to support a host-nation or interim government or as part of an occupation when no government exists. Stability operations involve both coercive and constructive military actions.<sup>20</sup>

How these companies support stability operations? Some of their tasks during stability operations are by restoring essential services and infrastructure development which can become the primary engineer focus in stability operations; however, all three disciplines are applied simultaneously to some degree. Essential services for engineer consideration include food and water, emergency shelter, and basic sanitation (sewage and waste disposal).<sup>21</sup>

Table 8 represents how construction companies support defense civil support authority operations. The BEB construction company can provide the most capability of all of the other elements, however, still limited of providing vertical construction to this kind of operations. The Modularity provides a big gap of multi-functionality among all other units. The Legacy construction company provides similar capability as the BEB construction company; however, it does not provide any combat engineer capability such as route clearance with the purpose of detecting/neutralizing explosive hazards.

Table 8. Legacy, BEB Const Company, Construction Company (EAB Modularity) in support of Stability Operations

Stability (BEB Const Co)	DCSA		Utilities	Conduct Reconnaissance	Harden Facilities	Provide Engineer Advice	Conduct Assessments	Detect / Neutralize Explosive Hazards
	Offense	Defense	Construct Positions	Horizontal Construction	Vertical Construction	Attack Enemy FOM	Construct CBT Roads	
Stability (Vert Const Co)	DCSA		Utilities	Conduct Reconnaissance	Harden Facilities	Provide Engineer Advice	Conduct Assessments	Detect / Neutralize Explosive Hazards
	Offense	Defense	Construct Positions	Horizontal Construction	Vertical Construction	Attack Enemy FOM	Construct CBT Roads	
Stability (Hor Const Co)	DCSA		Utilities	Conduct Reconnaissance	Harden Facilities	Provide Engineer Advice	Conduct Assessments	Detect / Neutralize Explosive Hazards
	Offense	Defense	Construct Positions	Horizontal Construction	Vertical Construction	Attack Enemy FOM	Construct CBT Roads	
Stability (Legacy Const Co)	DCSA		Utilities	Conduct Reconnaissance	Harden Facilities	Provide Engineer Advice	Conduct Assessments	Detect / Neutralize Explosive Hazards
	Offense	Defense	Construct Positions	Horizontal Construction	Vertical Construction	Attack Enemy FOM	Construct CBT Roads	

Source: Created by author.

Defense Civil Support Authority is Department of Defense support to US civil authorities for domestic emergencies, and for designated law enforcement and other activities (JP 3-28). Civil support includes operations that address the consequences of natural or manmade disasters, accidents, terrorist attacks, and incidents in the United States and its territories.<sup>22</sup>

According to FM 3-34 general engineering units provides the generating force elements of the Engineer Regiment such as the USACE will play a critical and significant role in civil support operations. TECs, under their OPCON relationship with USACE, can provide mission command support. Essential services of concern for engineers include providing:

1. Urban search and rescue
2. Food and water
3. Emergency shelter
4. Basic sanitation (sewage and waste disposal)
5. Minimum essential access to affected areas.

Table 9 represents what construction units past, present and future are able to provide as part of their mission set. Again, BEB Construction Company will provide the required capabilities to support decisive action, however, some limitation still exist for horizontal assets. The EAB construction company with the separate formations of vertical and horizontal companies provides separate capabilities. At this point it may not be required to conduct multi-functional missions, however, having these assets available may close that gap in the event a company may deploy in support of DCSA within CONUS which most likely will be covered by the National Guard or Reserve Component. The legacy construction company offers most of what the BEB construction unit provide, however, it does lack combat engineer assets.

The options include host nation civilians with minimal U.S. support, U.S. civilian contractors, Army Corps of Engineer management with a combination of contractors, the host nation military, U.S. Army construction companies, or a combination of the above. This would also depend on the technical environment of the mission, the host nation capability, the political climate of the host nation, the US. and host nation objectives.

Table 9. Legacy, BEB Const Company, Construction Company (EAB Modularity) in support of Defense Civil Support Authority

DCSA (BEB Const Co)	Stability		Provide Engineer Advice	Horizontal Construction	Conduct Assessment	Vertical Construction	Utilities
	Def	Off	Construct CBT Roads	Hauling	Construction Management	Attack Enemy FOM	Detect / Neutralize Explosive Hazards
DCSA (Vert Const Co)	Stability		Provide Engineer Advice	Horizontal Construction	Conduct Assessment	Vertical Construction	Utilities
	Def	Off	Construct CBT Roads	Hauling	Construction Management	Attack Enemy FOM	Detect / Neutralize Explosive Hazards
DCSA (Hor Const Co)	Stability		Provide Engineer Advice	Horizontal Construction	Conduct Assessment	Vertical Construction	Utilities
	Def	Off	Construct CBT Roads	Hauling	Construction Management	Attack Enemy FOM	Detect / Neutralize Explosive Hazards
DCSA (Legacy Const Co)	Stability		Provide Engineer Advice	Horizontal Construction	Conduct Assessment	Vertical Construction	Utilities
	Def	Off	Construct CBT Roads	Hauling	Construction Management	Attack Enemy FOM	Detect / Neutralize Explosive Hazards

Source: Created by author.

“Likely engineer missions are similar to those required in stability operations, except that they are not conducted overseas; they include: (1) Constructing and repairing rudimentary surface transportation systems, basic sanitation facilities, and rudimentary public facilities and utilities; (2) Detecting and assessing water sources and drilling water wells; (3) Constructing feeding centers; (4) Providing environmental assessment and technical advice; (5) Disposing of human and hazardous wastes; (6) Providing camp construction and power generation; (7) Conducting infrastructure reconnaissance,

technical assistance, and damage assessment; (8) Conducting emergency demolition; (9) Conducting debris or route clearing operations.”<sup>23</sup>

Other requirements that general engineer support may be required for the sustainment and protection requirements of the force and may be extended to support other agencies. “Likely missions include—(a) Base camp construction and power generation; (b) Debris or route clearing operations. (c) Construction and repair of expedient (temporary) roads and trails. (d) Forward aviation combat engineering to include the repair of paved, asphalt and concrete runways and airfields. (e) Installation of assets that prevent foreign object damage to rotary wing aircraft. (f) Construction of temporary bridging. (g) Construction and upgrade of ports, airfields, and RSOI facilities to ensure access to the region.”<sup>24</sup>

### Scenarios in Support of Decisive Action

Part of this thesis focuses on how engineer construction companies provide support to decisive action; the author has developed two possible scenarios where construction engineers are employed. The requirement is to provide horizontal and vertical assets in the construction of two base camps. The first base camp (scenario 1) is in support of combat operations. The second base camp (scenario 2) is in support of nation assistance or not combat related.

While the Army has several types of engineer units, the construction effects battalions (EAB Battalion assets), Brigade Engineer Battalion construction companies are specifically tailored for construction missions. These two scenarios are basically to apply the tasks already discussed in chapter 4. One way to examine these capabilities, the organization has to identify a unit that is capable of providing this kind of support. There

are two to three possible options that a BN could use in order to meet the intent of the project.

#### Scenario 1: Construct Base Camp in Support of Decisive Action

During wartime, construction companies will build roads, railways, pipelines, bridges, buildings, utilities, EPW camps, etc. While conducting offensive operations, construction units can be task to maintain roads, construct support facilities and repair runways. During defensive operations, a typical construction unit may construct and repair airfield, construction of support and repair facilities, as well as maintenance of lines of communications (MSRs and ASRs). Company X has been given the mission to construct a base camp in support of maneuver elements moving into sector for support of offensive, defensive and stability operations. The requirement calls for 600 personnel bed down (battalion size construction project). The constructing unit is required to build—force protection, Entry control point (ECP), HLZ, shower/latrine facilities, Office facilities, barrack facilities, fuel point, drainage, roads. What organization/assets are needed in order to get project completed prior to arrival of maneuver forces?

Option 1—One company will provide the horizontal effort and the other company will provide the vertical capabilities required to complete the project. Even a project of this magnitude could be command and control by a company headquarter, the battalion Headquarter will require to command and construction build as two units are operating in lateral effort.

Option 2—Companies are tasked organized as company teams. Company is now structured as multi-functional organization. The BN Headquarters is responsible for providing construction management and construction oversight of the project

Option 3– Unit is already transformed and operating with organic elements of legacy model, this way a company headquarter is responsible for providing the right project oversight and management of bills of materials and platoons construction efforts.

This scenario is similar to what the 864th Construction Effects Battalion had to conduct in Afghanistan during previous years. As indicated in chapter 2, the 864th Construction Effects Battalion was responsible for conducting construction operations. As 864th CEB reconfigure their forces, they were able to complete 11 Forward Operating Bases (FOBs) and 12 company Outposts (COPs). Additionally, they completed 11 security points/positions, six watch tower, one blocking position, over 32 kilometers of route work effort (construction, repair, or upgrades), 10 bridges emplacements, eight bridge removals, 26 stand alone buildings, 123 guard towers and conducted multiple emergency repairs. In total there were over 75,000 square feet of office space. Enough space to accommodate over 5,000 beds, while using 2.5 million cubic meters of gravel, 2.37 million board feet of lumber, 23 miles of HESCO walls for force protection, 1 miles of concrete barriers and 970 trusses. This kind of capability could only be accomplished by having a mixture of vertical and horizontal assets.<sup>25</sup>

However, a combination of vertical and horizontal capabilities (legacy unit type task organization) must be well coordinated as units try to execute major construction operations. Under modularity, vertical and horizontal companies are not able to effectively operate as multi-functional as they are not longer structure as the old model of legacy (Force XXI), does not train in both capabilities, and does not have the right leadership/knowledge to be able to operate as a legacy type organization. However, that does not mean that the unit is not capable of conducting full spectrum engineer mission,



but with proper training prior to deployment, the unit may be ready to command and control, manage and execute this kind of task. In order for a company to provide the right general engineering support, the unit has to be mixed with vertical and horizontal assets. This scenario demonstrate the need for some level of construction capability. Construction requirements includes maintenance and construction of this base camp as well major horizontal effort such as road and culverts within the camp. Prior to modularity the typical engineer construction company model was able to construct complex projects because a multifunctional capability was there and that played an important role for units in combat whether it was support or maneuver unit. This scenario proves how important is to maintain multi-functionality in the construction companies so that if future operations requires major construction operations, then the company is ready and set to provide such demand.

#### Scenario 2: Construct Base Camp in Support of Decisive Action–Nation Assistance

Construct a base camp in support of humanitarian mission may require slight or even same type organizations from combat operations and therefore may require require the same level of attention as the Army continues to transform its engineer forces. This scenario also examines the potential training benefits derived from Nation Assistance for combat operations. The project includes four schools, an administration building (B-Huts and C-Huts), improvements on a clinic, reconstruction of a bridge, and the drilling of nine wells, force protection, laundry/shower facilities.

This thesis looks at employment of construction companies in nation assistance from the interests of the United States government, the host nation, and the United States

Army. Ideally it would be best to serve the interests of all three all of the time. Theories of nation assistance, personal experience serving with a combat heavy battalion, and case histories will provide the basis for the findings. The mission that engineer forces performed in combat are similar concept and scale missions engineers are performing in support of humanitarian operations. The requirement to conduct construction operations simultaneously in support of a BCT still exist on a requirement like such. For example, the CSA, GEN Odierno's focus as wars in Afghanistan draws down, is to align our forces regionally where a BCT depending on the ARFORGEN cycle, may have to support a host nation with humanitarian assistance anywhere in the world. What assets are needed in order to fulfill a construction requirement in support of Nation Assistance? There are three possible options needed in order to provide the right fit for this project:

Option 1—Deploy two companies to provide horizontal and vertical capability. This will require a command and control element. Currently, a BCT does not have the required staff to properly manage construction operations. A battalion or higher element requires a CMS (construction management section) to provide construction oversight. This may be limited as a Brigade Combat Team is not authorized by MTOE and the engineer staff section may be limited to provide this kind of support as their role is mainly combat MOS.

Option 2—Companies are tasked organized under company teams. Company is now structured as multi-functional organization. The BN Headquarters is responsible for providing construction management and construction oversight of the project

Option 3—BEB Construction Unit support by his higher HQ provides this support. EAB Engineer units may have to task organized unit the old way (legacy) so that Construction Company can properly build, management project.

Option 4—If the project is too large or technical, other means such as U.S. contractors or the Corps of Engineer assets should be taken in consideration.

### DOTMLF Shortfalls

“Today’s Engineer Forces are inadequate for tomorrow’s needs.”<sup>26</sup> As described in chapter 2, the author will describe some of the areas within DOTMPLF in order to determine gaps/shortfalls for construction units while conducting combat operations or humanitarian effort (decisive action) specially focused on the three organizations evaluated in this thesis. The areas to consider within DOTMPLF are Organization, Training, and Leadership. However, the author through this research identified four major gaps within the current and future structure that may require the Corps of Engineer to pay additional attention. These areas identified as capability gaps are as followed:

1. Multi-Functional capability
2. Major construction operations (three subcategories)
  - Security Ops for engineer units
  - Vertical Construction
  - Horizontal Construction
  - Managing Projects and oversights (Project managements/project oversights)
3. Command and Control

### Gap: Multi-Functional Construction Capability

Organization: The current construction engineer force is divided in vertical and horizontal companies (EAB Engineer Construction Companies) which means they only have can provide one capability any given time to support a maneuver or supporting element. The future organization (only available in BCT–BEB Construction Company) closes that gap and provides multi-functionality for construction operations to that maneuver commander. However, that capability remains as an issue as EAB organization is not multi-functional. The new transformation allows the EAB construction companies to deploy separate from their parent unit; the capability of providing horizontal and vertical support simultaneously may be completely lost. As indicated in chapter 2, the author identified two units (864th Construction Effects Battalion and 19th Construction Effects Battalion) where all of their subordinates were reconfigured to the old legacy model in order to properly support construction operations. Additionally an recent article in the Engineer Magazine states that, “Forming engineer companies, with broader capabilities, as opposed to the specific vertical and horizontal skills of current units, could increase engineer effects on the battlefield.”<sup>27</sup>

Training: As identified in this chapter, training forces may depend on the type of organization whether is under an EAB Combat Effects Battalion or BCT Engineer Battalion (BEB). Current training approaches do not address the multi-functionality. How to plan and conduct horizontal and vertical construction simultaneously? How forces are embedded in order to maintain both capabilities as units prepare for future operations. The training process must address the capability to effectively train units to be able to conduct both operations. As the future Engineer Force Operational and Organization

states, “there are three components to FEF training concept that are the key: Life Long Learning, Adaptive Training and Operationally Aligned Training.”<sup>28</sup> Be able to Operationally Aligned Training is primordial for engineer construction companies “train how you fight.” Separate formations will continue to impede units be able to operate as one force.

Leadership: “Solution requires educating leaders”<sup>29</sup> at every level to clearly understand how to affect his/her area of responsibility in any type of operating environment. Having the right Officers and Soldiers requires time/money and resources. For the most part, junior Officers and Soldiers do not fully understand the capabilities of what a multi-functional construction offers as the unit conducts construction operations. “If the U.S. Army Engineer School restructured and created a general engineer MOS that taught Soldiers the basic of vertical and horizontal construction, company commanders would have a much more versatile force.”<sup>30</sup>

Required Capability (Recommendation): Re-Organize to vertical and horizontal units (legacy model). Build the HQ section inside the company with the required MOS that can provide oversight of both horizontal and vertical projects.

Gap: Major Construction Operations is Divided in Three Subcategories

1. Security Ops for engineer units
2. Vertical Construction
3. Horizontal Construction
4. Project managements/project oversight

Organization: one of the tasks for engineer units is to secure itself while conducting construction operations. However, most construction MOS’s lacks of

knowledge that are gained through other branches within our forces (for example Infantry or Combat Engineers). The EAB Construction Effects Battalion energizes its units to continue to train as Infantry; however, it may lose emphasis on their primary mission which is to conduct general engineering operations at any given time. The future BCT Engineer Battalion within the Construction Company closes that gap by adding a Route Clearance Platoon which has the capability of providing security and route clearance to engineer forces. The EAB Construction Company has to have a similar capability (section, squad, or even platoon) that can provide external security while “builders” are conducting their Route Construction or COP /FOB builds to allow Maneuver elements to move in. As FM 3-0 states, “Security—never permit the enemy to acquire an unexpected advantage. Security protects and preserves combat power. Security results from measures a command takes to protect itself from surprise, interference, sabotage, annoyance, and threat surveillance and reconnaissance.”<sup>31</sup>

Vertical/Horizontal Construction: Most construction missions conducted by the Engineer Effects Battalion are done by the vertical and horizontal companies. The units mostly reorganize its forces in order to support the mission—as indicated in the first capability gap. Construction operations such as Base camps, constructing/repairing roads, enhancing force protection require both capabilities. As indicated by CPT Bogardus, “in the general engineer company format, each company commander would have three platoons that are capable of taking on any mission with organic assets,”<sup>32</sup> if multi-functionally is taken in consideration. Additionally, CPT Borgardus indicated that “in building tactical infrastructure, combat outpost, and forward operating bases, maneuver commanders are concerned with how quickly the task can be completed.”<sup>33</sup> Time plays

always a factor during the military decision making process (MDMP) as to how soon can forces be operational within their battle space in order to conduct decisive action.

Construction companies or battalions are usually supporting the BSO and tasks to plan, integrate, and execute construction operations within their battle space.

Project Management and Oversight: is a responsibility of every Leader within a construction unit. The leader is expected to understand how to manage a project, how to provide construction oversight and lastly how to conduct Quality Assurance and Quality Control of a build.

Training: Currently each EAB Construction Company conducts its own training on unique tasks and TPPs utilized in Operation Enduring or Iraqi Freedom. Each unit has a unique training program that teaches tactics, techniques and procedures to any given environment. Units must continue to do so and participate on combat training with other combat units or training provided by the Engineer Center Maneuver of Excellence to better prepare our forces to future combat or contingency operations. Continue to place an emphasis on simultaneous training of horizontal and vertical operations. This type of organization must continue to emphasize the important of how to manage complex projects (accountability of BOM materials, work schedules and phases of the construction operations for both horizontal and vertical projects). The more equip leaders are the better they will perform in missions.

Most of the Army Construction Effects Battalions have deployed to combat operations and “conducted operations across multiple engineer functions on an area basis.”<sup>34</sup> Training units as they fight has always been the most important priority for our forces. Pending on how units train at home station may test the capability for such unit to

deploy and operate in combat or peacetime operations. A unit that spends 90 percent of their time training on a specific task (vertical or horizontal only) may limit themselves initially the capability while performing combat. In order to breach this gap, companies either train as a combined force or organized their forces while in the theater of operation. Re-structuring the construction companies so that multi-functionality is not lost in the event units conduct major construction missions in support of a BCT.

Leadership: The concept of multi-functional Soldiers/Officers will not eliminate the need for unique skilled needed to perform construction operations. Leader should have an emphasis in master planning, project oversight. This requires further evaluation of future commanders in order to maximize resources/time and to ensure mission success.

Required Capability: Sapper or Route Clearance platoon organic to EAB Construction Effects Battalions or companies, continue training in project management.

#### Gap: Command and Control

Organization: The current force (EAB Construction Companies) lacks the appropriate force capable of performing COP/FOB builds. The future organization need to reorganize so that allows that company commander to provide both horizontal and vertical capabilities to maneuver or supporting elements. As CPT Bogardus stated, “engineer units are usually asked to accomplish a wide variety of missions and expected to have a general understanding of all aspects of military construction.”<sup>35</sup> This is a reality for engineer forces whether they are combat (Sapper or Route Clearance) or construction forces (Vertical and Horizontal). A maneuver commander is more interested on how soon (time) he can employ combat forces in specific areas within their Battle Space. The Proper organization of the engineer company is the first hurdle to conduct construction



oversight/management. A unit that does not have vertical and horizontal platoons may limit itself from giving the right support. The BCT Engineer Battalion closes that gap by providing a multi-functional company to support construction operations in decisive action. However, the current EAB construction effects unit continues to train and possibly deploy with separate formation and then force their units to change in theater as full engineering missions or operations are being tasked to execute.

Training: The current force lacks of coherent means to execute their missions. The HQ section provides command and control of its forces. The HQ section either lacks of horizontal or vice versa knowledge in order to manage, oversight, and provide quality assurance/control its projects. However, a comprehensive training approach should require full understanding of both horizontal and vertical construction so that when units merge (for deployment purposes) they are capable of managing and leading their forces properly.

Leadership: Training for commanders and other leaders within their organization on both vertical and horizontal capabilities and how to use both capabilities during missions.

Required Capability: Creation of Multi-functional construction companies.

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<sup>1</sup>“The Future Engineer Force,” *Military Technology* 31, no. 7 (July 2007).

<sup>2</sup>Ibid.

<sup>3</sup>Force Management, “Brigade Engineer Battalion Concept Brief” (Fort Leonard Wood, MO, February 10, 2011).

<sup>4</sup>Department of the Army, FM 3-34.

<sup>5</sup>Jim Rowan, Deputy Commandant. U.S. Engineer School and Regimental HQs, “Achieving the Vision 2010 and Beyond” (Slide Presentation, *Brigade Combat Team Engineer Battalion (BEB)*, 24 August 2010).

<sup>6</sup>Force Management, “Brigade Engineer Battalion Concept Brief.”

<sup>7</sup>FMS Web: TOE Master Section 1 for Construction Engineer Battalions or construction effects battalion as new concept calls.

<sup>8</sup>Directorate of Futures and Capabilities Development, *Future Engineer Force Operations and Organizational Concepts* (Fort Leonard Wood, MO: United States Army Engineer Corps, 2010).

<sup>9</sup>Directorate of Futures and Capabilities Development, *Future Engineer Force Operations and Organizational Concepts*; Engineer Force Transformation Table of Organization. 2010.

<sup>10</sup>Directorate of Futures and Capabilities Development, *Future Engineer Force Operations and Organizational Concepts*.

<sup>11</sup>FMS Web

<sup>12</sup>Department of the Army, FM 3-34.

<sup>13</sup>COL Thomas O'Hara, “Engineer Support to Future Full-Spectrum Operations” (Research Project, Army War College, Carlisle, PA, 2008).

<sup>14</sup>Department of the Army, ADP 3-0, *Unified Land Operations*.

<sup>15</sup>*Ibid.*

<sup>16</sup>Department of the Army, Field Manual (FM) 3-0, *Operations* (Washington, DC: Government Printing Office, February 2008).

<sup>17</sup>Department of the Army, FM 3-34.

<sup>18</sup>Department of the Army, FM 3-0.

<sup>19</sup>Department of the Army, FM 3-34.

<sup>20</sup>Department of the Army, FM 3-0.

<sup>21</sup>Department of the Army, FM 3-34.

<sup>22</sup>Department of the Army, FM 3-0.

<sup>23</sup>Department of the Army, FM 3-34.

<sup>24</sup>Ibid.

<sup>25</sup>Task Force Pacemaker, 3, no. 6 (September 1, 2007).

<sup>26</sup>Directorate of Futures and Capabilities Development, *Future Engineer Force Operations and Organizational Concepts*.

<sup>27</sup>Walter K. Bogardus, "Should the General Engineer Battalion Transform, Again?" *Engineer* (January 2012).

<sup>28</sup>Directorate of Futures and Capabilities Development, *Future Engineer Force Operations and Organizational Concepts*.

<sup>29</sup>Ibid.

<sup>30</sup>Bogardus, "Should the General Engineer Battalion Transform, Again?"

<sup>31</sup>Department of the Army, FM 3-0.

<sup>32</sup>Bogardus, "Should the General Engineer Battalion Transform, Again?"

<sup>33</sup>Ibid.

<sup>34</sup>MAJ William C. Hannan, "Can the Modular Engineer Battalion Headquarters be Multi-functional?" *Engineer* 39, no. 2 (May-August 2009): 66-70.

<sup>35</sup>Bogardus, "Should the General Engineer Battalion Transform, Again?"

## CHAPTER 5

### CONCLUSION AND RECOMMENDATION

The purpose of this research was to assess the engineer construction companies in today's Army organization based on structure and lessons learned from Operation Enduring Freedom in Afghanistan. The primary research question asked if the corps of engineers needs to re-structure engineer construction companies again in order to support decisive actions. The answer to that question is yes. However for the time being, organizations have to re-organize in order to keep the pace of the operational demand for construction during operations. Army Transformation has been the primary focus during the last 10 years of war, and the Army will continue to transform as other emerging requirements arise in the upcoming years. The Corps of Engineer has developed a force structure in "blocks" in order to execute decisive action in support of a BCT (H/S/I).

As MAJ Don Nestor mentions, "after taking a look at engineer forces supporting decisive action, it is clear that the need for an engineer capability will continue to exist in the future to support the maneuver commanders. The decision that must be made is whether or not these assets are organic to the brigade or get attached for the specific mission. Looking back in history, at initial operations in Vietnam, Afghanistan, and Iraq, the greatest need for engineer augmentation was with general engineering organization. The organic engineer companies and battalions could provide limited mobility and countermobility support, but often needed assistance for construction, sustainment, and survivability operations."<sup>1</sup>

However, lessons learned have proven that the Army requires a more robust engineer construction support capable of conducting full spectrum engineer operations and the current modular structure has in some ways diminished that.

The analysis presented in chapter four suggest that in order for a construction unit under modularization (EAB Engineer Construction Effects Battalion) to be effective, it requires a combination of engineer capabilities—called multi-functional, so that it can provide full construction engineering support to maneuver or supporting elements. These units trained separately while at home station. However they must be task organized differently in order to support decisive actions (mainly offense, defense, stability operations).

This chapter summarizes the finding from the analysis of the EAB construction companies (EAB Construction Effects Battalion—separate formations, especially vertical and horizontal companies) and recommendation for the Brigade Engineer Battalion (BEB—construction company) organic to the BCT.

### Recommendations

The Engineer force structure needs to be reassessed in order to employ the construction companies more effectively in today's structure and any future operating environment. As a result of the study, the author offers the following two recommendations for improving the engineer construction companies force structure.

#### EAB Construction Effects Battalion (Construction Company)

1. Maintain one vertical and horizontal company as part of the organization.

Restructure one company as a multi-functional organization (mix of three vertical and one horizontal platoon) which is based on the old “legacy” model and add a

Sapper or Route Clearance Company organic the Battalion for security operations and assured mobility missions.

2. Companies should have full vertical and horizontal capability in order to operate effectively

3. Relook to at least one engineer company with full engineer capability

4. Relook to add an additional Sapper Company to the Construction Effects

Battalion

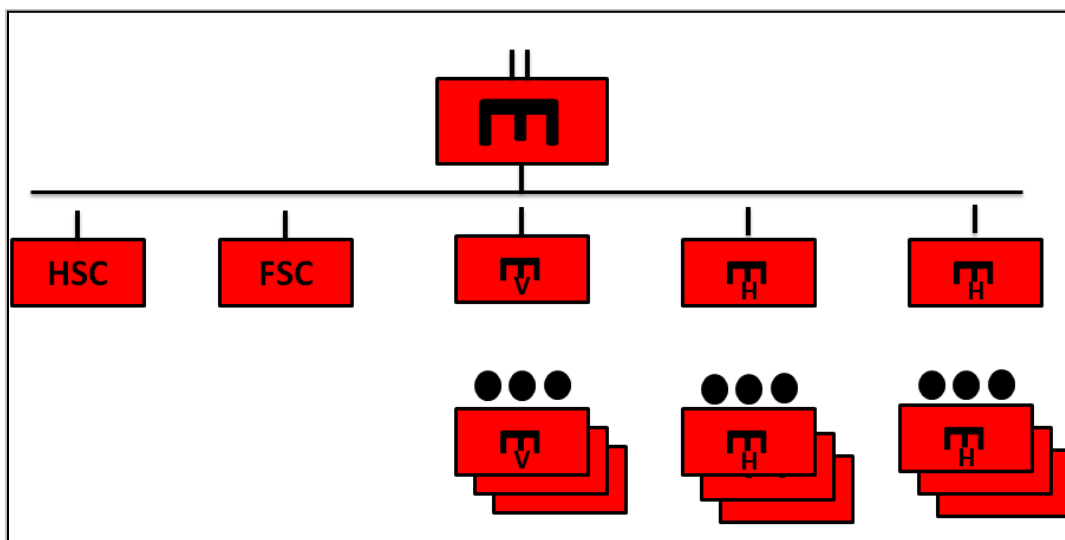


Figure 22. Current Construction Effects Battalion Structure

*Source:* Created by author.

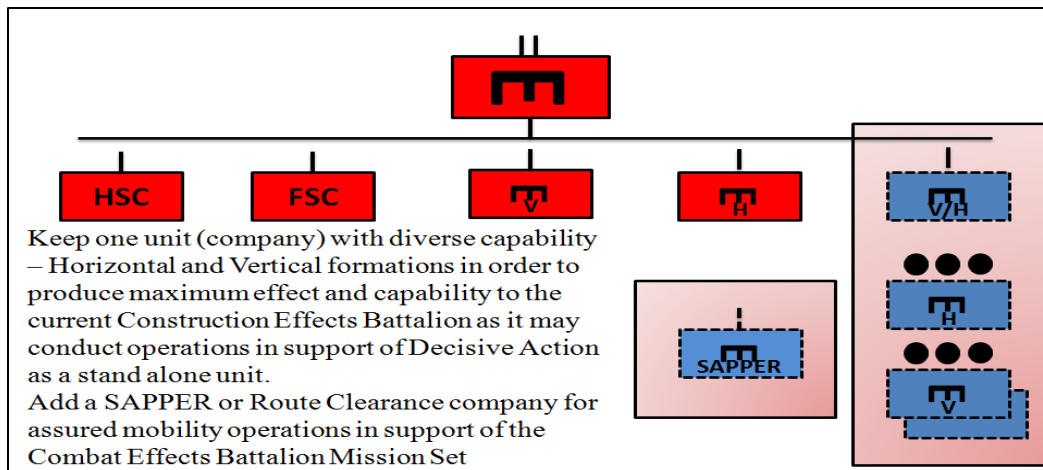


Figure 23. Recommended Force Structure under Construction Effects Battalion

Source: Created by author.

#### Brigade Engineer Battalion (BEB Construction Company)

Add 1 vertical platoon to the current proposal for the BCT Engineer Battalion in order to add more capabilities for major construction operations.

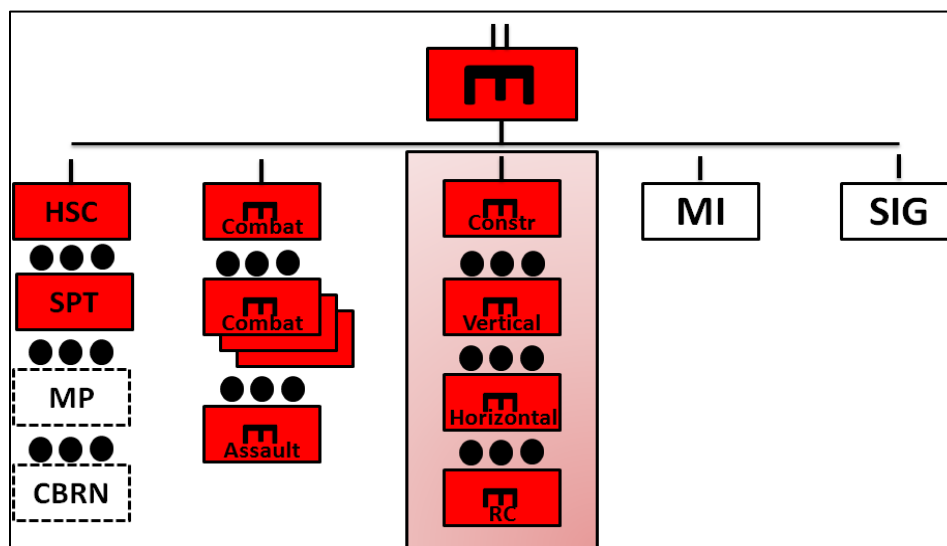


Figure 24. BEB Structure

Source: Brigade Engineer Battalion Concept brief.

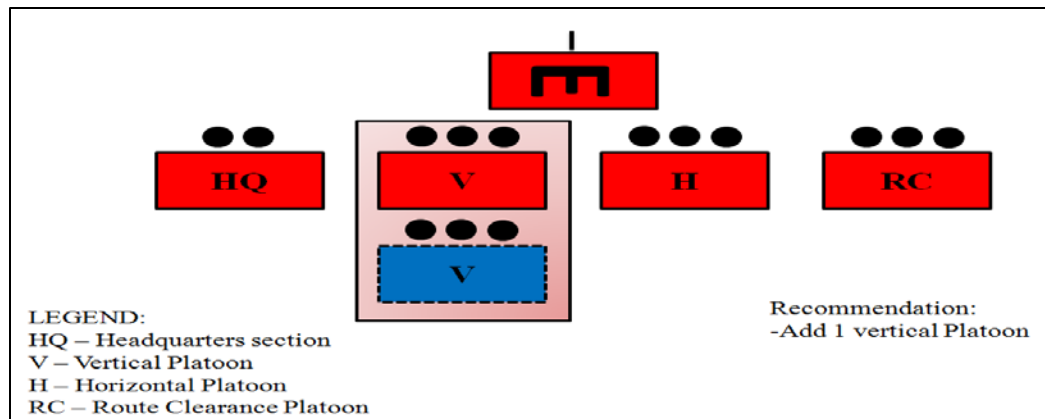


Figure 25. Recommended Force Structure for BEB (Construction Company)

*Source:* Created by author.

### Future Research

This thesis identified some of the gaps found in three different construction companies' structures. These gaps were based on how units are currently organized and the implications they continue to have as they conduct operations in support of decisive action. As the BCT Engineer Battalion is yet a concept not been employed in any theater of operation, the author recommends that future researchers may focus on the operational impacts of having only one vertical and horizontal platoon as part of the construction company. Additionally, the author recommends focusing on the other aspects of DOTMLPF, primarily on materiel, personnel and facilities as the debate continues among leaders in order to identify what is the right fit for engineers in support of maneuver elements. Whether or not one multi-functional unit provides enough capability within the Construction Effects Battalion (EAB) construction companies also a matter that should be methodically investigated and resolved. Different challenges may arise as units may regionally realign in support of the other combatant commands (COCOM).



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<sup>1</sup>Don A. Nestor, “Engineer Force Structure within the HBCT” (Monograph, School of Advanced Military Studies, 2008).

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